

copy 3

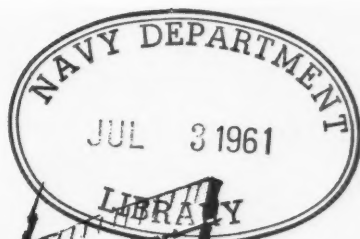
93

THE OFFICIAL

ARMY INFORMATION DIGEST

U.S. ARMY MAGAZINE

JULY 1961



WHERE

LAND AND SEA

MEET

Special ☆☆☆☆

☆☆ Navy Issue

ARMY INFORMATION DIGEST



THE OFFICIAL MAGAZINE OF
THE DEPARTMENT OF THE ARMY

The mission of ARMY INFORMATION DIGEST is to keep personnel of the Army aware of trends and developments of professional concern.

The Digest is published under supervision of the Army Chief of Information to provide timely and authoritative information on policies, plans, operations, and technical developments of the Department of the Army to the Active Army, Army National Guard, and Army Reserve. It also serves as a vehicle for timely expression of the views of the Secretary of the Army and the Chief of Staff and assists in the achievement of information objectives of the Army.

Manuscripts on subjects of general interest to Army personnel are invited.

Direct communication is authorized to:
Editor, Army Information Digest, Cameron
Station, Alexandria, Va.

Unless otherwise indicated, material may be reprinted provided credit is given to the Digest and to the author.

Distribution: To be distributed in accordance with DA Form 12-4 requirements.

Picture Credits: Illustrations are by U. S. Navy or Marine Corps.

COVER: In this Special Issue, the Army salutes the Navy and Marine members of the tri-service land-sea-air team. Convergence of these forces in an amphibious landing operation is depicted by CAPT Gerard Richardson, USNR. Back cover shows another dimension of naval power—the undersea launching of a Polaris missile.

COMMAND LINE

Army Views on Vital Issues

Several months ago, General George H. Decker, Army Chief of Staff, addressed the following letter to Admiral Arleigh Burke, Chief of Naval Operations.

"Dear Arleigh:

"In keeping with the ever-increasing emphasis on joint and inter-service aspects of our defense effort, I am constantly seeking ways and means of improving understanding and appreciation, among Army personnel and the public alike, of the interdependent nature of our armed forces.

"I consider the ARMY INFORMATION DIGEST an excellent medium to impart this understanding. As the Army's official magazine, it is invaluable in explaining to the American soldier the role and mission of all the Services and how each supports and contributes to the national security.

"With your cooperation, I would like to salute the Navy and Marine Corps with a special issue of the DIGEST. As I envision it, . . . the issue would emphasize the Navy role in the tri-service team. The Marine Corps also would be represented. . . . Other articles to be furnished by your staff might cover the surface fleet, naval aviation, the undersea fleet, Navy weaponry, research and development achievements—all designed to convey an understanding of the Navy man's role to his Army associate in uniform. . . .

"I have long maintained that the land, sea, and air components of our national military power are interlocking elements—each indispensable and complementary to the others, forming an integrated team. The Army's official magazine hopes to give tangible expression to this concept in the realm of information and ideas."

Sincerely,

G. H. DECKER
General, United States Army
Chief of Staff

This issue of ARMY INFORMATION DIGEST—a product of inter-service teamwork—is the tangible result of that letter.

FEATURES

Foreword	2
<i>Secretary of the Navy John B. Connally</i> <i>Admiral Arleigh Burke, Chief of Naval Operations</i>	
The Navy Concept of Balanced Power ..	4
<i>Vice Admiral W. M. Beakley</i>	
How the Navy Serves the Army	10
<i>Vice Admiral John Sylvester</i>	
How the Army Supports the Navy	17
Polaris Packs the Punch	22
<i>Vice Admiral W. F. Raborn</i>	
The New Role of Amphibious Power ...	28
<i>Rear Admiral John S. McCain, Jr.</i>	
Antisubmarine Warfare	34
<i>Rear Admiral Lloyd M. Mustin</i>	
New Horizons for the Navy	40
<i>Vice Admiral John T. Hayward</i>	
U. S. Combined Operations Since 1775 ..	44
<i>Rear Admiral Ernest M. Eller (Ref.)</i>	
An Open Letter	57
<i>General David M. Shoup, USMC</i>	
What Makes a Marine?	58
<i>Major General S. S. Wade, USMC</i>	
Amphibious Warfare in the Nuclear Age	68
<i>Lieutenant General J. C. Burger, USMC</i>	
Marine Aviation—A Partner	74
<i>Major General Arthur F. Binney, USMC</i>	
The Corps of Tomorrow	80
<i>Brigadier General B. A. Hochmuth, USMC</i>	

BRIEFS

Project Mercury Astronaut in Space ...	56
News of Professional Interest	86
Golden Anniversary of Naval Aviation ..	89

EDITOR

Lt. Col. Robert J. Coakley

ASSISTANT EDITOR

Maj. David M. Peters

PRODUCTION EDITOR

Maj. Charles G. Wellborn, Jr.

SENIOR ASSOCIATE EDITOR

Samuel J. Ziskind

ASSOCIATE EDITORS

Owen J. Remington

Raymond B. Klee

ART DIRECTOR

T. S. Patterson

CONSULTANTS—THIS ISSUE

CDR Ernest G. Greene

LTJG Joseph A. Lynch

THE OFFICIAL

ARMY
INFORMATION
DIGEST

U. S. ARMY MAGAZINE

JULY 1961
VOLUME 16 NUMBER 7



THROUGHOUT the world today, all members of the Armed Forces bear grave responsibilities. The forces of our Nation's defense team are heavily committed because, as a country founded on the principle that the inalienable rights of man are God given, we have pledged to aid those nations who desire to maintain their independence and to remain free. Our combined efforts to meet those who challenge man's right to be free can readily be seen in the outstanding readiness of our soldiers and airmen in Europe and the Far East and in the sailors and marines who sail with the Sixth and Seventh Fleets.

In the articles on the following pages, distinguished military leaders describe how the United States Navy and Marine Corps have solved some of their problems in the past and the preparations being made to meet the challenges of the future. Various aspects of seapower are discussed such as antisubmarine warfare, amphibious warfare, the missions of the Navy and Marine Corps as well as areas where the Army and the Navy mutually support each other.

To the Department of the Army and the editors of the ARMY INFORMATION DIGEST, I would like to express the appreciation of the Navy Department for this opportunity to better acquaint those who proudly serve their country in Modern Army Green with the contributions that the Naval Service is making to the security of our country as your partner on the Nation's defense team. We are happy to be "on board" for this edition and I hope all who receive this issue will find it, as usual, interesting and enlightening reading.

JOHN B. CONNALLY
Secretary of the Navy



ON BEHALF of all Navymen it is a distinct pleasure and privilege to have this opportunity to greet the members of the United States Army, to outline the role the Navy plays, with you, on the national defense team and to reaffirm the interdependent roles of all our armed services.

The basic role of the Navy, to protect and defend America by control of the seas, is essentially the same as it was 150 years ago. However, naval influence has grown enormously, and the weapons systems necessary to exert this influence have expanded accordingly.

Control of the seas is indispensable for the prevention of all-out war, and if need be, for the long climb to victory after a nuclear attack. To maintain control of the seas, the Navy's battleground has always been the oceans which cover three quarters of the earth's surface. However, today, modern weapons like the jet airplane and the guided missile greatly extend the Navy's radius of action. It can participate in a massive exchange, live through it, and carry on decisively after the initial enemy blow. It also participates with all its elements in wars and events of lesser intensity. To fulfill this basic role in the modern world, the Navy has developed new weapons to perform many new tasks:

Detect and provide early warning of enemy attacks using the far reaching network of radar systems in ships and aircraft of the fleet.

Be ready to launch retaliatory measures at an enemy's industrial and military heartland with all of the aircraft and guided missiles in the Navy's arsenal.

Utilize the Navy's surface, airborne and underwater weapons and weapons systems to keep the seas clear of enemy naval forces.

Protect herself from attack—from the air, from the sea, or from under the sea.

Provide the ships and protection required to back up the overseas mission needed for final victory by transporting thousands of troops and tons of equipment across the seas.

Keep the sea lanes open for the raw materials that America must import to keep the industrial arsenal working to full capacity and for the export of the weapons and equipment to our allies.

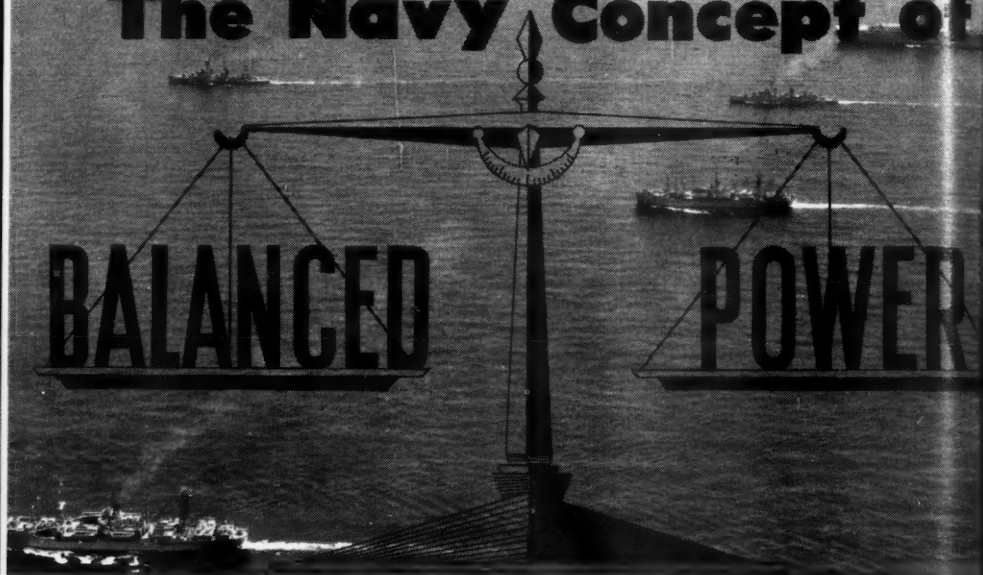
Inspire our allies and discourage potential aggressors, by maintaining a force in being in the far corners of the earth.

We face these tasks of staggering proportions with confidence, secure in our knowledge that with our sister services we will fulfill our missions of preserving peace and freedom.

ARLEIGH BURKE
Chief of Naval Operations

*Fleets of ships, subs, aircraft backed by shore stations
make up the flexible, mobile multipurpose force which wields*

The Navy Concept of



Vice Admiral W. M. Beakley

GREAT strides forward have been made in the decade just past to obtain greater effectiveness and modernity in all naval weapons systems, support equipment, bases and installations. There remains very little comparison between the effectiveness of the modern Navy and the existing sea power of the World War II era. "Overpowering Might" has been successfully replaced with "Balanced Power." The Navy of today approaches the optimum type force that is flexible, mobile, potent and multipurpose.

Primary Striking Power

FOREMOST in importance in any arsenal are the implements designed to carry the fight to an aggressor. To the Navy, these implements are the Fleets. Divided into geographical areas to facilitate rapid application of force, the four Fleets provide the Navy's primary striking power.

The First Fleet in the Eastern Pacific and the Seventh Fleet in the Western Pacific are the mobile, ready forces available to the Commander in Chief, Pacific to use in support of United States policies throughout the

broad Pacific Ocean areas.

The Second Fleet in the Western Atlantic, under command of the Commander in Chief, Atlantic, and the Sixth Fleet in the Eastern Atlantic and Mediterranean, under command of the Commander in Chief, Europe, provide the sea power to perform the missions assigned in support of United States and NATO policies in the Atlantic Ocean areas.

Each of these Fleets is a well-coordinated striking force, composed of similar components, and of nearly the same proportions. The main power is obtained from the Attack Carrier Striking Forces; consequently the Fleets are organized to exploit fully the offensive capability of the carriers, their fighter and attack aircraft, and the missile cruisers and destroyers.

While the Attack Carrier Striking Force provides the big punch, secondary power is vested in the Amphibious

Striking Force. With troop and equipment transports, specially configured assault helicopter carriers, landing craft, and command/communication ships, this Force performs the massive evolutions of an amphibious landing utilizing both frontal attack and vertical envelopment.

Of highly significant importance are the Anti-Submarine Forces, which are formed of Anti-Submarine Warfare carriers with their fixed-wing and helicopter aircraft, destroyers, submarines, seaplanes and land-based patrol planes. Logistic Forces, to provide the all important replenishment-at-sea of the Striking Forces, are made up of ships of the Service Force which are capable of delivering oil, aviation fuels, ammunition, food and spares.

The Submarine Force, comprised of conventional and nuclear-powered Attack and Polaris submarines, provides the Fleet with a powerful under-

In far-flung international waters, the Navy deploys highly mobile fleets whose striking power provides the regulated force needed to deal with any situation.



sea component for attack in both general and limited warfare.

Service Forces, complementing the major combatant forces of the Fleets, supply necessary services by such auxiliaries as repair ships, tenders, tugs, and patrol, harbor and mine craft. Additionally, ships and aircraft of the Fleet, employing electronic and underwater sound detection devices, provide extensions of the Distant Early Warning network for defense of the United States.

Thus, each Fleet commander has at his disposal the means to implement any form of retaliatory warfare that may be directed. The capability of the Fleet ranges from participation in full-scale nuclear warfare, through limited war, to landing party actions with small-arms firepower. Anywhere in this spectrum may be found the means to provide for, or to contribute to, the proper application of force. The strength of the Fleet has been aptly described by the Task Force admiral who said "tell us how much pressure you want and we will do the right amount of squeezing."

The Fleets operate under the concept of level-readiness, which insures that the main striking force is always fully manned, equipped and combat ready. To facilitate routine maintenance and upkeep without materially affecting the overall readiness posture in the more forward areas, units are regularly interchanged between the Fleets deployed to areas far from

home ports and bases and the Fleets operating closer to United States installations.

Fleet training is uppermost in importance at all times, with individual ships and squadrons conducting daily drills to attain proficiency; Task Forces frequently conducting group exercises; and Fleets often conducting national or joint and combined battle problems with friendly foreign navies in all parts of the world. Constant training not only serves to maintain a high level of proficiency of the Fleet personnel, but aids in the development of new equipment and techniques.

The Fleet performs many missions incidental to their primary purposes. In times of major disasters in countries throughout the world, naval units are on the scene to aid in evacuation, provide medical assistance, relieve food shortages, and assist temporarily distressed citizens. Many a merchant ship crewman owes his life to the prompt assistance extended vessels in distress by ships of the Navy.

Many rescue operations, extending over vast ocean areas, have been conducted by naval forces searching for downed aircraft. Navy ships often are diverted from regular routes to ascertain the health and welfare of inhabitants of areas far removed from regular transportation lanes.

Fleet Capabilities

ADVANCING technology has, to a large degree, dictated the state of the



Vice Admiral W. M. Beakley
Deputy Chief of Naval Operations
(Fleet Operations and Readiness)

art of modern warfare. Tactics are continually adjusted to take into account the advantages gained through the development of equipment. Electronic equipment that increases the range of target acquisition, missiles that provide for longer standoff distances, and aircraft that are capable of greater performance are some of the tools of the modern tactician.

The Fleets operate with maximum flexibility. The strength of a Task Force rapidly expands and contracts, as portions of the force are added to or withdrawn to suit any particular phase. Although guided by decisions made in advance planning, the individual Task Force Commanders exercise flexibility in the manner in which an operation is conducted. Innovations are encouraged, as new tactics must keep pace with new equipment.

Randometric formations, dispersed over large areas, allow individual units to move freely within the limits of prescribed boundaries. With the advance of missile technology, greater distances between individual ships are allowed without sacrificing mutual support, thus affording more advantageous area coverage. Improved capability of equipment, resulting in such advantages as extended radar surveillance patterns and faster and more secure tactical communications, has increased force capabilities without increasing ship requirements. Thus relatively smaller Task Forces, widespread and maneuvering independently, have achieved greater mobility and offensive potential.

The power of the Fleets to contribute to a general war, should one be initiated by an aggressor, has never been greater. Each Attack Carrier Striking Force, moving into position far at sea, has the capability to launch aircraft to deliver a devastating nuclear attack on targets many miles inland. These Forces have the alternative of withdrawing completely following such an attack or moving many hundreds of miles to attack again.

From their advantageous positions of concealment underneath the surface of the oceans, nuclear-powered submarines can launch Polaris nuclear missile attacks, pinpointing targets more than a thousand miles away. The capabilities of mobility and attack from concealment are prime advantages in warfare.

In situations which dictate a more limited application of force in response to aggression, the Fleets are singularly suited to perform tasks peculiar to the initial phase. They also are capable of providing immense support to the combined effort of all the Services in the Follow-On phases.

The Attack Carrier Striking Force, spearheading the power of the entire Fleet, can effect a high-speed approach to an objective area; it can establish and maintain air superiority both at sea and overland by delivering repeated conventional weapon air attacks, providing continuous close air support to ground forces, conducting devastating shore bombardment, and maintaining surveillance through air and submarine reconnaissance.

The Amphibious Force is fully prepared to follow this initial phase by transporting Marine forces to establish a beachhead through amphibious assault. Capable of moving men, equipment and landing craft into close proximity of the shore line, formations of Attack Transport ships comprise the main body of the assault force. Helicopter carriers, with their deckloads of 'copters for rapid air-deployment of troops, join the main body in the objective area. Command and communication ships, performing the mission of mobile command centers, would be positioned close to the landing area.

The Anti-Submarine Warfare Force can control and suppress surface and undersea threats to objective areas and approaches. This Force can conduct convoy and escort operations, providing essential protection to sea transport units moving personnel and equip-

ment. The Submarine Force can range at will in performing the tasks of preventing free use of the sea by enemy attack or supply forces. The Service Force can provide logistic support at sea to Strike Forces to allow relative independence of shore installations.

The surface transport of large numbers of Marine assault forces and Army divisions, and mass movement of their heavy equipment and supplies, is largely dependent on how well the Fleets function in the performance of their retaliatory role. Since the retaliatory might of all the United States armed forces must be projected and maintained overseas in any type of war, the success of a sustained military operation is dependent on the successful accomplishment of control of the seas by the Navy.

Manpower

REGARDLESS of the effort expended to reach an optimum level of weapons readiness, complete capability cannot be achieved without the proper numbers of trained personnel. In the past, military operations could be undertaken with a predominance of relatively unskilled manpower. But as weapon sophistication increases and complexity of equipment advances, requirements for carefully trained, technically superior personnel grow accordingly. Systems and equipment now utilized in the Navy dictate that the majority of assigned personnel be highly skilled.

To meet the requirement for acquisition and retention of superior quality personnel, the Navy has instituted a program of Selective Training and Reenlistment, designed to provide incentive to qualified men to undergo formal technical training in certain specialized fields. For selected personnel who agree to remain on active duty for an extended period, accelerated promotions are made possible. This program is just one of a series of benefits offered the Navy man in return for longer utilization of his special qualifications.

Installations

SHORE facilities which provide essential support to the operating forces of the Fleets are maintained throughout the United States. Shipyards to perform maintenance and overhaul of ships and equipment are located in ports readily accessible to both the Atlantic and Pacific Fleets. Supply depots and centers are strategically situated to maintain the flow of materiel to key points designated as Fleet bases.

Aviation complexes are located so that pilots may obtain maximum training utilization of weapon ranges, instrument flight facilities and carrier landing practice fields. Amphibious assault landing training is accomplished at specially located facilities, designed to provide a maximum amount of realism to all exercises.

Technical schools provide the im-



British carrier *Ark Royal* is flanked by *USS Valley Forge* and *USS Saratoga* (right) at Norfolk Naval Base.

equi-
ual-
uted
and
in-
ergo
tain
con-
tive
cel-
ble.
ries
in
his

es-
rces
ugh-
to
l of
in
the
ply
ally
ate-
leet

so
ain-
in-
rier
ous
om-
ies,
um
im-

oyal
Val-
a-a-
folk



USS Saratoga (CVA-60) refuels guided missile cruiser USS Boston (CAG-1) at sea as destroyer USS Miller (DD-535) proceeds in company with the two larger ships.

portant classroom and practical education for all phases of naval operations. Naval hospitals are located near every major installation.

Flight and submarine training is conducted at specially adapted facilities. Research and test activities, devoted to development of new weapons, equipment and techniques, also are established in areas best suited for the type of research work performed.

The Shore Establishment is extensive, having interest in every conceivable system designed for modern warfare. Primary concern of every facility is to "Serve and Support the Fleet."

Role of the Navy

THE principal mission of the Navy is to insure United States control and

utilization of all the seas of the world in time of conflict. The strategy upon which the concept of sea supremacy is based is offensive in nature. Enemy forces would be searched out and destroyed to eliminate any threatened restriction to free use of the seas. The role of the Navy in supporting the overall objectives of the Armed Services in time of war is well-defined; the weapons systems that will insure the satisfactory enactment of that role are in a ready status.

Today, the extent of available power in the Fleets is controlled by the limited numbers of ships and aircraft in operation, but within those limitations, the most effective application of force is found through the concept of balanced power.

*Inter-service cooperation takes many forms,
in this accounting of*

HOW THE NAVY'S



IT HAS often been said of the Navy's shore establishment that "its sole mission is to serve the Fleet." This is no longer entirely true. Today the vast complex of naval bases and support activities—at home and overseas—has assumed a dual support responsibility.

First, and still foremost, it must support the operating forces of the Navy—providing necessary support for the ships and aircraft of the Fleet, wherever they may be deployed—plus support to the other shore activities of the Navy. Second, and steadily

growing in importance, the Navy also provides, through its vast logistic complex, a large measure of support to its sister Services.

The framework for accomplishing this interservice support is prescribed by the Secretary of Defense in a far-reaching policy statement, published last year as DOD Directive 4000.19. This comprehensive policy directive prescribes basic policies and principles for interservice support throughout the Department of Defense; it includes virtually every type of logistic and administrative service required by the

Y SERVES THE ARMY

Vice Admiral John Sylvester

Armed Forces in the conduct of military operations.

Interservice support, as defined by the Secretary of Defense, includes all aspects of logistic and administrative support associated with research, development, test and evaluation; acquisition, storage, movement, distribution, maintenance, evacuation and disposition of materiel; movement and evacuation of personnel; medical services; communications services; and the acquisition, construction, maintenance, operation and disposition of facilities.

The objective of the interservice support program is to achieve the maximum utilization of existing support facilities of the military Services, whenever overall economies can be realized without impairing military effectiveness. Duplication of facilities

and overlapping of support functions common to two or more services within a single geographic location are to be avoided.

Single Manager Functions

THE Department of Defense is the world's largest business. Measured in terms of dollars invested—in plant equipment, facilities, and inventories—it is seventeen times greater than the entire General Motors complex.

As an integral part of this gigantic support organization, the Navy serves the Army in a number of different ways. Specific responsibilities have been assigned the Navy to support the Army in a broad range of designated materials and services. For example, in the field of supply management, the Navy operates three separate

Single Manager agencies for the Department of Defense. It must insure that the material requirements of the Army—as well as those of the other Services—are met for all categories of petroleum products, medical materials, and industrial type supplies.

In the field of transportation, the Navy operates the Military Sea Transportation Service, more commonly known as MSTS. This agency is also designated as a Single Manager, and is responsible for providing the ocean transportation required in support of U. S. military operations overseas.

In the field of research and development, test and evaluation, the Navy operates the huge Pacific Missile Range. Here the Army's Nike-Zeus, among others, is being tested and evaluated.

Following are some of the many important ways in which the Navy is serving today's modern Army.

Military Sea Transportation Service

IN August 1949, the Secretary of Defense issued a directive creating a new agency to provide "under one authority" the sea transportation service for personnel and cargoes of the Department of Defense. On 1 October 1949, the Navy's Military Sea Transportation Service (MSTS) was established to serve as the Department of Defense Single Manager for Ocean Transportation.

The newly-formed agency, a major component of the Navy, was charged

with performing a threefold mission:

To provide sea transportation for personnel and cargoes of the Department of Defense (excluding personnel and cargoes transported by units of the Fleet);

To plan and negotiate for use of commercial shipping to augment the MSTS nucleus fleet, as necessary, to meet total requirements; and

To plan for and be capable of expansion in time of war.

Since that time, MSTS-operated ships have sealifted throughout the world more than 10 million Army troops and dependents; 132 million measurement tons of Army cargo; and 56 million long tons of petroleum products for Army use.

Continuous liaison is maintained with the Army to operate, design, and build ships which are needed to meet the mobilization requirements of the Army.

During the Korean War, more than 90 percent of Army troops and cargoes to the Far East was transported by MSTS-controlled shipping. Afterward, MSTS operated the "Magic Carpet Express" to insure a fast passage home for Army troops.

In 1951, MSTS began extensive Arctic operations in support of our Far North defense sites. In addition to sealifting millions of tons of building materials and supplies, MSTS ships, over a seven-year period, transported more than 40 thousand Army Engineers and Army Transportation



**Vice Admiral John Sylvester,
Deputy Chief of Naval Operations
(Logistics)**

Corps personnel to assist in the construction of our Nation's early warning systems.

In 1955, MSTs and the Army participated in the largest two-way peacetime transoceanic troop movement in American history—Operation Gyroscope. Providing for the overseas rotation of entire Army divisions and dependents at one time, the operation began when the *USNS Upshur* transported 1,447 officers and enlisted men of the 10th Infantry as replacements for the 1st Infantry Division in Germany. By November 1955, more than 36,000 troops, 8,000 dependents, and 8,500 tons of household goods had been lifted by MSTs between New York and Bremerhaven alone.

To give the Army greater mobility and flexibility in the transportation of military equipment, the *USNS Comet*, the first true roll-on, roll-off ship, was built. The *Comet*, capable of lifting one-sixth of the organic equipment of an Armored Division, was the result of a joint Army-Navy study. This modern ship is capable of rapid loading and discharging of vehicles under their own power by means of four side ports and one stern ramp.

Petroleum

SINCE 1956, the Navy has had the responsibility for world-wide procurement of all bulk petroleum products. The Single Manager agency established within the Navy to perform this function is the Military Petroleum Supply Agency (MPSA).

Unlike other Single Managers for supply commodities, MPSA does not own its wholesale stocks of fuels. Instead, ownership of bulk products is vested in each of the Services. Storage and issue to other Services is performed in accordance with interservice supply support agreements. (See "Army Petroleum Logistics," December 1960 DIGEST.)

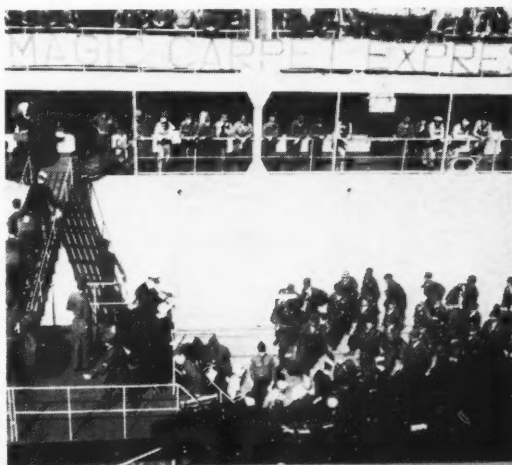
MPSA's primary function, therefore, is to procure refined petroleum



Army helicopter hovers over MSTs transport *USS Corregidor* after launching at sea off Beirut during Lebanon crisis.



Army equipment is sealifted to Korean theater, above, while below combat veterans return home in MSTs transport.





Fast modern tankers rush Army petroleum products overseas in support operation by versatile MSTs fleet.

products required by all the individual Services. In terms of dollars or gallons, this is a gigantic task. During the past fiscal year, MPSA purchased more than 12 billion gallons of products at a cost of \$1.2 billion. This was the equivalent of contracting at the rate of about \$5 million each working day of the fiscal year.

MPSA is the petroleum industry's largest single customer, with annual purchases amounting to about seven percent of the total United States production of refined petroleum. Petroleum products required by U. S. military forces scattered around the world, no matter how isolated, are supplied from MPSA contracts. MPSA in turn purchases products throughout the entire Free World, from such likely sources as the United Kingdom and France to such unlikely sources as Taiwan and the Philippines. The Army overseas is one of the largest "customers" of MPSA purchasing efforts.

MPSA also must arrange with MSTs for tanker transportation of bulk fuels from the refinery to the desired destination delivery point, normally a POL storage facility in CONUS or overseas.

In addition to procurement, MPSA also directs the inspection program for petroleum products. This includes inspection at the time of procurement, and quality surveillance of all bulk products in stock at military fuel facilities. The Navy performs this inspection function for all Services in

the Persian Gulf, other portions of the Middle East, in Southeast Asia, and the South Pacific.

The Navy also has single service procurement responsibility for purchasing coal in the Department of Defense. This function is performed by the Navy Fuel Supply Office, the retail inventory control point within the Navy for POL products. During the past year, the Navy purchased for the Army over one million tons of coal, at a cost of \$6.3 million.

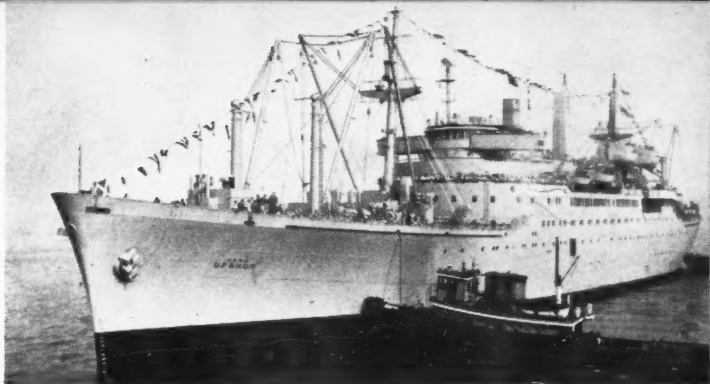
In addition to procurement, the Navy furnishes POL support to the Army in various parts of the world, under terms of interservice supply support agreements. For example, last year the Navy issued for Army use some 11,000 barrels of aviation gasoline, 95,000 barrels of automobile gasoline, 105,000 barrels of diesel oil, and over 3.3 million barrels of Navy special fuel oil. The total cost of all bulk fuels furnished to the Army through these interservice support arrangements exceeded \$8.3 million.

Other supply management functions which are coordinated by the Navy through MPSA include cataloging and standardization of petroleum products. The Navy compiles and issues a single Federal Supply Catalog for petroleum items for use by all Services, and distributes POL product specifications to Army test laboratories overseas.

Medical Support

IN January 1957, under the single manager concept, overall procurement

USNS *Upshur*, one of 14 MSTs transports used to move troops, arrives in New York from European port of embarkation.



and inventory management responsibility was assigned to the Navy for wholesale stocks of medical and dental materials required by the Department of Defense. The resultant Single Manager for medical supplies and equipment is the Military Medical Supply Agency (MMSA), which operates under the direction of the Secretary of the Navy and is located in Brooklyn, New York.

To meet the needs of the Army and the other military departments, MMSA annually purchases some \$65 million in medical and dental supplies. At twelve major depots of the Army, Navy or Air Force, stocks of medical materials are strategically positioned at widely dispersed geographic locations throughout the continental United States. An inventory valued at over \$300 million and representing some 9,000 different items is currently maintained.

Besides seeking the most economical "buy," an important consideration of MMSA procurement is to insure that a fair proportion of purchases and contracts for medical supplies and services is placed with small commercial firms. The agency works closely with the Small Business Administration in furthering this important program. During the past year, about sixty percent of all MMSA awards went to small businesses.

In implementing DOD policies for joint utilization of medical facilities, the Navy provides care and treatment to active and retired members of all

of the Uniformed Services, and to their dependents, at certain naval hospitals which are designated as "regional hospitals."

At naval hospitals, both in CONUS and overseas, last year about 15,000 Army patients were admitted for treatment. Of these, about one-half were Army dependents and the remainder active and retired Army personnel. In addition, the Navy treats numerous Army personnel and dependents on an "outpatient" basis. In 1960, outpatient Army care accounted for about 300,000 individual visits.

STILL another example of Navy support to the Army is the Navy's Tissue Bank which provides support, upon request, to Army medical facilities for stored human tissues. The most extensive collaboration is with the Walter Reed Army Medical Center. Tissue supplies have included cornea, bone, skin and dura mater.

In September 1960, a MATS-chartered commercial aircraft en route from the Philippines to Travis AFB crashed and burned on Guam, resulting in the death of Army, Navy, and Air Force personnel and dependents. An emergency plan involving all three Services was immediately placed in effect. The Naval Hospital at Guam, as the largest medical facility near the crash, coordinated on-the-scene efforts. Through the cooperation of all Services, the remains were recovered, identified, and delivered to their destination for burial.



Army stevedores unload cargo arriving aboard MSTs supply ship to support an Army operation in Arctic during 1957.



Nearly all materials used in building the Army's Camp Century in Greenland (1959-1960) arrived via MSTs vessels.

Industrial Supplies

THE most recent addition to the Navy's Single Manager family is the Military Industrial Supply Agency, established during the past year in Philadelphia. MISA provides all Army requirements in military industrial supplies, including hardware and related items, paints, and metals. As in the POL and Medical fields, MISA has centralized procurement responsibility for purchasing consolidated requirements of all Services for industrial supplies.

A principal feature of MISA's single manager distribution system is the concept of direct distribution from industry to major military consumers. To avoid the high cost of double handling, replenishment of stock is often arranged on a direct basis. Thus a large customer activity such as an Army Ordnance facility may be resupplied direct from the manufacturer, rather than from a Single Manager wholesale point. Substantial savings in transportation and handling are achieved under this concept.

Pacific Missile Range

THE Pacific Missile Range is the

Nation's third and largest missile firing installation. Managed by the Bureau of Naval Weapons, it represents, along with the Army-directed White Sands Missile Range and the Air Force-directed Atlantic Missile Range, one-third of our Nation's missile launching and observation facilities.

During the past three years, the Pacific Missile Range (PMR) has expanded from its nucleus, the former Naval Air Missile Test Center at Point Mugu, California, into an ocean-spanning, continental shore activity of prime importance to the Nation's space program. Today it encompasses mainland sites, nine Pacific island installations, various multi-purpose instrumentation recovery or tracking ships, and a rapidly increasing fleet of specially configured aircraft.

In the Pacific, the range is equipped with both fixed and mobile bases. In Hawaii, tracking stations are installed on Oahu and Kauai. Other islands which have been instrumented and staffed for permanent use include Canton Island, French Frigate Shoals, Midway, and Wake.

A large installation has been established on Kwajalein and adjacent is-

lands, specially tailored for testing the Army's anti-missile missile, the Nike-Zeus. The PMR is the supporting range for the Army's Nike-Zeus, and tests will be fired from Point Mugu as well as Kwajalein.

Shipbuilding

BY LAW, the Navy is required to coordinate shipbuilding functions for the Department of Defense. The Chief of the Navy's Bureau of Ships is designated as the Department of Defense Coordinator of Shipbuilding, Conversion and Repair. As such, he is responsible for planning and coordinating the design, procurement, construction, conversion and repair of ships and related craft for Department of Defense agencies.

A joint Army-Navy agreement implements this single service procurement program assigned to the Navy.

Other Support

THE Navy also is furnishing a substantial amount of local support to the Army, on a daily basis, at various locations throughout the world.

In Taiwan, for example, the Navy has primary support responsibility for many of the housekeeping functions required in support of the U. S. forces there. The Naval Support Activity at Taipei operates island-wide on Taiwan in furnishing community support facilities for commissary store and subsistence support; dependents' schooling; medical care; recreation; chaplain services; housing; transportation; and other related services.

Similarly, in Southeast Asia, the Navy operates Commissary Stores and Exchanges at Bangkok and Saigon for support of Army families and other United States personnel in the American communities at these locations.

In Naples, at the Headquarters of the NATO Commander in Chief for Southern Europe, the U. S. Navy furnishes full community support services to all Army families present in the area.

These are but a few examples of the numerous instances of the teamwork which exists today, wherein the Navy is functioning on a day-to-day basis, in local support of the Army.

***The Navy's food and the Marine's rifles
are among the many items
in the catalog of***

How the Army Supports the Navy

RELATING how the Army supports the Navy is comparable to describing the performance of a chair by discussing the function of one leg. Interservice cooperation in the development of the integrated land-sea-air team involves the interdependent functioning of four military serv-

ices. Army support of the Navy is a part—but an important part—of the whole picture.

It is a primary function of the Army to organize, train, and equip Army forces for the conduct of prompt and sustained combat operations on land—specifically, forces to defeat

enemy land forces and to seize, occupy, and defend land areas.

In preparation for combat and conduct of operations, the Army supports the sea and air components of the land-sea-air team in those aspects of logistics and administration which stem from the Army's assigned roles and missions as the land component of the team. The Army has unique capabilities to provide this support to the Navy and the Marine Corps.

In time of war it has been axiomatic that the team members would unhesitatingly provide each other whatever support would gain the common objective. Between wars, the principle of mutual support has been applied for economy of operation. In this way manpower and dollar resources are conserved for present and future military missions.

Cooperation in Practice

INTERSERVICE support has received increasing emphasis since the Korean War. Since 1955 the Secretary of Defense has assigned six single managerships to the Department of the Army. Under this plan, the Secretary of the Army has the assigned responsibility of providing to the entire Department of Defense—including the Navy and Marine Corps—the commodities of subsistence, clothing and textiles, general supplies, construction supplies, and automotive supplies. In addition, the Department of the Army is the assigned single manager for traffic management.

Following are some examples of the benefits of Army support of the Navy and the Marine Corps:

After the Wonsan amphibious operations on the east coast of Korea in 1950, the 1st Marine Division, Fleet Marine Force, continued extensive land operations as an important element of the U.S. X Corps in the eastern zone of Korea. The logistics system of the 1st Marine Division was integrated into that of X Corps, and

the Division drew logistical support from the Army for common items of supply and equipment.

Army support of the Leathernecks was simplified by the high percentage of common items of equipment used by Army and Marine elements. The Marine fighter used the same rifle, bayonet, pistol, helmet, and cartridge belt as his Army counterpart. He drove the same ubiquitous ¼ ton weapons carrier. His infantry weapons, his ammunition, and many of his vehicles were identical. In short the Army was able to supply most of the Marine Corps' basic supply and equipment from Army stocks—all because of the long-established and continuing Army responsibility to develop and provide ground combat materiel.

Communications support furnishes another outstanding example. Although the global communications systems of the services are separately managed, they employ compatible procedures, are interconnected to permit exchange of traffic, and share circuits wherever practicable.

The Pacific Scatter Communication System which is managed by the Army Signal Corps as a part of the Army's world-wide Strategic Army Communications Network (STARCOM) extends from Hawaii to the Philippines, and is one of the largest of its kind in the world. It uses advanced propagation techniques known as ionospheric and tropospheric scatter to give 99 percent reliability.

The overall system is managed by the Army, and consists of eight interconnected relay stations, six of which are operated by the Army, and two by the Navy—those at Midway and Guam. While built primarily to meet Army requirements, its facilities are available to all the services.

Army medical facilities throughout the world provide varied and continuing service to the Navy and Marine Corps. Annually, Naval personnel and their dependents average 1000 daily visits to Army dispensaries and each

Army's missile range at White Sands, N.M., is used to test such weapons as Talos now in use on Navy ships.



day occupy 700 beds in Army hospitals. At Tripler Army Hospital in Hawaii, Navy men and their families are the largest service group among the patients hospitalized, and at the Army hospital on Okinawa Naval personnel and dependents account for about 52 percent of in-patient care. Army medical laboratories in the continental United States and overseas provide on-call support to the Navy, and the Army furnishes veterinary service, primarily food inspection, also on-call.

The Army school system supports the Navy and the Marine Corps through training of key officers and enlisted men in a broad array of subjects. Next year more than 1400 Navy and Marine Corps students will use available quotas for courses in Army schools and colleges, including the

Army Chemical, Engineer, Infantry Airborne, Artillery, Ordnance, Air Defense and Army Language Schools. The Army's senior colleges—the Command and General Staff College and the Army War College—annually provide advanced military education for selected members of the Navy and Marine Corps.

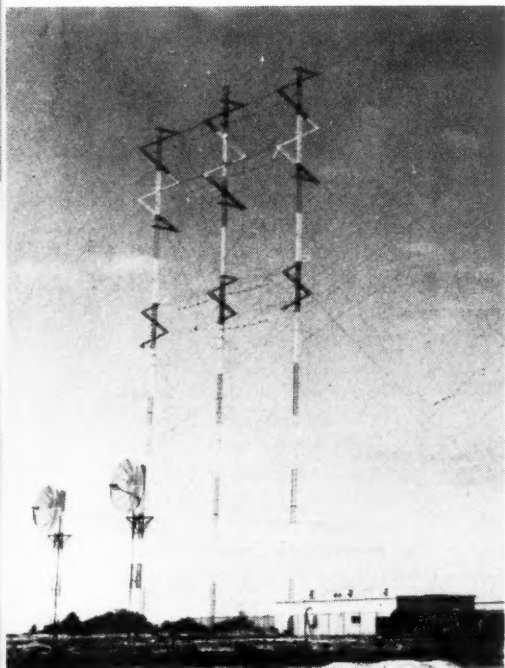
Heraldic services are an assigned function of the Army, and are available to all agencies of the Government. The Army designs and develops heraldic items such as insignia, awards, medals, ribbons, flags and badges for the Navy and Marine Corps subject to the approval of the Secretary of the Navy. The Quartermaster General has contributed to the development of many familiar Navy heraldic items, including the Robert Dexter Conrad Award, the Distin-

guished Service Award, and the Distinguished Civilian Service Award. Recently it created the design for the National Aeronautics and Space Administration medal awarded CDR. Alan B. Shepard for his flight into space.

The Quartermaster General also has assisted in developing plans for Naval aircraft markings, designed ship badges, and prepared heraldic illustrations for both the Navy and Marine Corps.

The Army supports Navy missile research, development, test and evaluation at the Army's White Sands Missile Range in New Mexico, one of the three national missile ranges. Support functions include range communications, collection and reduction of flight data, and provision of range instrumentation and facilities. The

Tall arrays of "piggy-back" reflectors surround Signal Corps' Scatter System communications station on Wake Island.



Navy has used the range for the testing of such weapons as the Aerobee and Talos.

The Navy-directed Operation Deep Freeze in Antarctica gave Army Arctic experts an unusual opportunity to apply special knowledge and skills in support of the Navy. Army Transportation Corps representatives surveyed and marked trails across unexplored Antarctic territory, advised the Navy concerning ground equipment and safety factors for scientific traverse parties, and took charge of tractor trains operating over a distance of 647 miles between Little America and Byrd Station. The Army representatives led teams which established a 436-mile trail along the Ross Ice Shelf between Little America and the main base at McMurdo, and an 804-mile extension to the South Pole.

The Army also aids in a multitude of daily tasks at installations wherever military and naval units are stationed. Local support by Army chaplain offices, dependents' schools, bakeries, dry cleaning plants, supply rooms, shoe shops, utilities installations, commissaries, fire stations, clothing stores, motor pools, post offices and exchanges is commonly provided to Navy and Marine Corps members at Army installations overseas.

This type of support is most evident in the Pacific areas. On Okinawa, where Army support of Navy is substantial, the Army also operates a petroleum pipeline system which provides fuel for the fleet, and it stores and maintains ammunition for the Marine Corps.

Single Manager Role

OPERATION of the Military Subsistence Supply Agency (MSSA) illustrates Army support of Navy through single manager assignments. Originally established in 1956, MSSA is the operating agency responsible for purchasing, warehousing, distributing and inspecting all foods supplied at wholesale level to the Army, Navy, Air

Force and Marine Corps. Altogether, the Navy and Marine Corps will "purchase" about \$176 million worth of food supplies from MSSA this year—representing about 26 percent of expected total "sales."

To provide this support, MSSA maintains 173,000 contracts annually with more than 3,100 food manufacturers, processors and dealers nationwide. Its regional headquarters keep in close touch with seasonal markets to obtain quality foods at the most economical sources.

Among its activities, MSSA provides items that are peculiar to the needs of its customers. Operational rations designed to meet special Navy requirements include Abandon Ship; Life Raft, Aircraft; and the Marine Corps, 25-in-1, Landing Force.

Crews on nuclear submarines have enjoyed a new type of special ration resulting from Quartermaster research and development. These are the freeze-dehydrated foods which are lightweight and easily preserved in submarine storage. When water is added, the foods quickly recover their original color, shape, volume, texture, and taste.

MSSA, it should be emphasized, operates at the wholesale level; thus the Navy and Marine Corps plan their own menus, utilizing normal subsistence and special products obtained through MSSA.

The other single managers provide service in a similar manner. The Navy is also a good customer of the Military Clothing and Textile Supply Agency (MCTSA). Navy and Marine Corps together will purchase about \$77 million worth of supplies, or about 24 percent of the total programmed sales this year.

The Military Construction Supply Agency (MCSA), Military General Supply Agency (MGSA), and Military Automotive Supply Agency (MASA) are the newest of the single manager assignments to Army. While these agencies are not yet fully opera-

tional, MGSA is already providing general supplies to the Marine Corps, and MCSA expects to begin furnishing construction supplies to all customers in October 1961.

The Military Traffic Management Agency (MTMA) directs and controls military traffic by commercial transportation within the United States; it also controls use and operation of military owned surface transportation which may be required to supplement commercial transportation. A substantial portion of MTMA's effort currently is in support of Department of the Navy.

In addition to these single manager operations, the Army also provides support through single department procurement assignments and coordinated procurement agreements. The Army is responsible for procuring for all military departments 16 commodity classes of supply containing thousands of individual items. For these it plans, consolidates requirements, analyzes the market, purchases, administers contracts, obtains licenses, and arranges for inspection and transportation of the various commodities.

For example, the Army expects to purchase nearly \$80 million worth of hardware for the Navy and Marine Corps this year, including such items as 7.62mm cartridges for the NATO rifle, 120mm projectiles, propellants for missiles, Hawk missile systems, Honest John rockets, Nike rocket motors, VT fuzes, M60 machine guns, bayonets, M14 rifles, $\frac{3}{4}$ ton cargo trucks, $\frac{1}{4}$ ton ambulances, meteorological equipment, and gas masks.

Whether the support consists of wholesale supply management, routine housekeeping, or assistance in developing and testing sophisticated weapons systems, the important fact is that support is mutually given and received. Such support not only contributes to economy and efficiency in the military establishment; it is a form of teamwork which is essential to the national security.

*The Navy's nuclear-powered,
long-range deterrent*

POLARIS



OUR buckskin-clad forefathers learned it from the Indians. The Continental Army taught it emphatically to the Redcoats. It had nightmarish qualities for the U. S. Cavalry out west. Today it gives basic value to the Navy's Polaris fleet ballistic missile weapon system. And potential enemies are fully aware of it.

"What you can't see, you can't hit."

In today's era of technological advances this might translate to "what you can't find, you can't destroy," but the principle is identical.

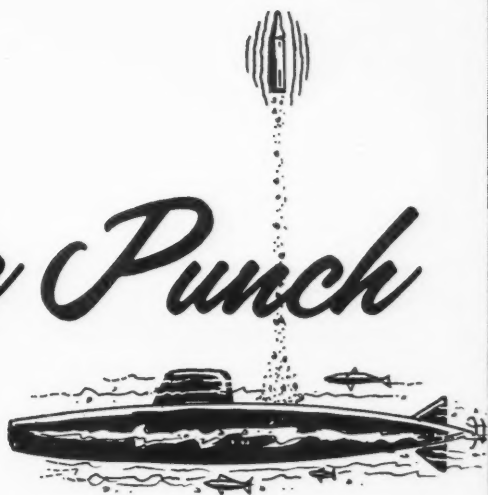
Operating in their natural habitat,

the rugged countryside of the colonies, the patriots made maximum use of long-range marksmanship and the protection of the deep woods. We're all familiar with the results.

This same simple truism led to the development of a submarine-launched missile weapon system. For what better place than in the ocean depths can you remain hidden, yet watchful—an invisible but real force—ready to defend our country.

Right now this force consists of two nuclear-powered, Polaris missile-firing submarines patrolling somewhere in

Packs the Punch



Vice Admiral W. F. Raborn

the Atlantic. Soon a third fleet ballistic missile (FBM) submarine will slip out to sea to join her sister ships and more will be on station by the end of the year.

Each submarine carries sixteen nuclear-tipped Polaris missiles and packs more destructive power than all of the bombs dropped by air forces of all countries during World War II. This includes the two atom bombs which hastened the end of the Pacific war and ushered in the era of nuclear power.

By early 1965, if Congress passes the President's budget as submitted, there will be 29 FBM submarines available to provide the Free World with a defensive ring of nearly 500 Polaris missiles. Ultimately the Navy hopes to have an FBM submarine force of 45 ships.

It may be possible for an enemy to seek out and attack one or two of these submarines in advance of an all-out attack, but, as a system, the Polaris is well-nigh invulnerable.

FBM System

JUST what is the fleet ballistic missile weapon system?

Simply stated, it's the missiles, the submarines, the supporting facilities and, most of all, it's the designers, builders and the Navymen who man the cruising submarines.

Polaris is a two-stage ballistic missile about 28 feet tall and weighing about 30,000 pounds. The solid-fuel propellant used in each stage looks much like the rubber in an automobile tire.

Polaris A-1, which is operational now, can hit a target with pinpoint

accuracy over 1300 miles away.

Flight testing of Polaris A-2, a 1740-mile range version, has been going on at Cape Canaveral since November 1960 and it will be loaded in FBM submarines starting early next year. This will be followed by a third generation missile with a 2500-nautical mile range.

With the submarine itself being, in effect, a first stage, Polaris is in fact an ultra long-range weapon. FBM submarines can make almost unlimited extended submerged cruises, their only limitation being the endurance of the crew.

Considering that over 70 percent of the surface of the world is navigable waters, these submarines have a tremendous domain in which to hide and wait. Their nuclear power plants make it unnecessary to surface to recharge batteries or refuel.

FBM submarines of the *George Washington* class are about 380 feet long with a beam of about 33 feet and displacement of about 5900 tons. They are comparable in size to a light cruiser.

Two more classes—longer and heavier—are being built. The *Ethan Allen* class will be operational in early 1962; and *Lafayette* class submarines will be available in 1964.

All three classes will be able to fire the third generation Polaris A-3 missile when it is ready, thus giving the subs that much more room to roam in and the ability to hit any spot any-

where on the face of the earth.

Each FBM carries sixteen missiles stowed in eight pairs of vertical launching tubes. Each has a 300-ton capacity air-conditioning plant, as well as air scrubbers and precipitators to remove irritants and maintain the proper balance of oxygen, nitrogen and other atmospheric elements.

After a submerged cruise of over two months, one of the first remarks made by crewmen when their sub surfaced was that the fresh air seemed foul, and "let's close the hatch."

Navigation and Fire Control

TO MAKE Polaris a working reality, pinpoint accuracy over long periods is a prime requisite. A new means of navigation was required—and not merely to keep the subs off the sandbars.

The fire control system constantly feeds data into the "brain" of the missile so that if the word should come to fire, the missile will know where it is, where it's supposed to go and the best way to get there.

An absolutely accurate navigation system therefore had to be devised. The Ships Inertial Navigation System (SINS) was the answer. Now FBM subs can always tell exactly where they are.

The fire control system can launch Polaris missiles at short intervals so that in a very few minutes a sub's total fury can be unleashed. These missiles are launched by an air-ejection



Vice Admiral W. F. Raborn
Special Projects Officer,
Office of the Secretary of the Navy

VADM Raborn (left) discusses cutaway model of first sub in Polaris program with ADM Arleigh Burke, CNO.



system which forces the missile from its tube and propels it up through the water to a point above the surface where it ignites. The system is patterned on torpedo launching methods.

When a missile is launched, all the crew can hear is a slight thump as it leaves the tube.

To back up the FBM operational force, the Navy has established a network of support facilities which includes missile testing sites, naval shipyards, submarine tenders, an experimental test firing ship and a navigational test ship.

Submarines going on operational patrol for the first time outload tactical missiles at Charleston, North Carolina. After that they can change missiles as necessary when they come alongside the tenders for maintenance.

Crew Training

THE fleet ballistic missile weapon system has been called the "most complex weapon system ever developed." But with all its complexities, the system is only as good as the sailors who run it. FBM crews have more than proven their capabilities both in test launchings and on operational patrols.

The endurance of the submarines has led to a new concept of manning ships. Each FBM submarine has two complete crews of about 110 officers and men, tagged Blue or Gold. While Blue crew is on patrol, Gold will be

on leave or undergoing refresher training.

The specialized knowledge required of FBM personnel reads like a course catalog at M.I.T. To maintain and operate equipment for which he is responsible the FBM sailor must be thoroughly familiar with basic theory and fundamental physical principles involved. He must also know every piece of gear, how it works, and how it fits into the complete system.

Much of the training is carried out at contractor plants but more and more is being taken over by the Navy. An FBM training school has been established at Dam Neck, Virginia. Here the curriculum includes studies of the basics of digital computers, computer logic, transistor theory, use of new testing devices, and the like. At least half the students' time is spent in laboratories.

Before undergoing this specialized training, each man goes through regular submarine school. Naturally, not all of the men are technicians. The goal is to have each man fully trained before he reports to his ship.

The advent of the FBM submarine has not changed the axiom that the submarine service is the best-fed group in the military.

In addition to doing everything possible to make submarines livable, the families of deployed crewmen receive special attention. Guidance and help

are available at personnel assistance centers, where a wife can get all the information she needs on how to care for everything from babies to autos.

Adequate housing has been arranged at home port so the submariner will know that his family is properly housed in an area where people who know and share his problems will be available to help out.

Production Achievement

WE in the Navy are proud of the FBM system, particularly of the exceptionally short time it took to bring it from breeding ground to battle-ready. The military-civilian contractor team produced this revolutionary weapon system in less than four years. General Eisenhower paid tribute to this feat in a special message to Congress when he stated, "Never in my long military career has a weapon system of such complexity been brought from its original conception to the operational stage with such sureness and speed—an achievement that in its entirety has taken less than five years."

President Kennedy, in calling for a further acceleration of the Polaris program in his Defense budget message, declared: "The ability of the nuclear-powered Polaris submarine to operate deep below the surface of the seas for

long periods and to launch its ballistic, solid-fuel nuclear-armed missiles while submerged gives this weapon system a very high degree of mobility and concealment, making it virtually immune to ballistic missile attack."

Interservice Teamwork

LIKE all other developments in the missile field, Polaris was laid on the foundation of ideas and knowledge developed and expressed through the work of many men in many programs.

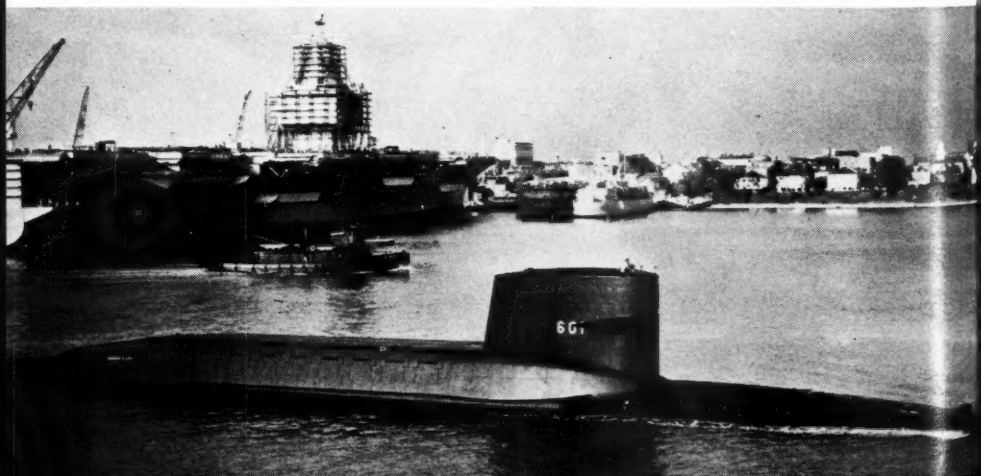
When the Navy formed the Special Projects Office in December 1955, it was with the idea of joining the Army in the development of the liquid fuel missile now known as Jupiter.

For nearly a year we worked alongside such Army missile pioneers as Major General John B. Medaris, and Dr. Wernher von Braun, absorbing their knowledge and know-how. We soon came to realize that the size of the proposed missile, and problems involved in storing liquid fuel, would make the use of this missile aboard ship impractical, at the very least.

Fortunately, a breakthrough in solid fuel propulsion was made about that time and the Atomic Energy Commission indicated that a much smaller nuclear warhead was forthcoming.

A solid-fueled missile would be smaller and much safer for shipboard

Later to become the third Fleet Ballistic Missile submarine to fire Polaris, USS Robert E. Lee (SSBN-601) moves away from her berth at builder's yards in Virginia.



use. Accordingly, the decision was made to concentrate on the solid-propelled missile. But we were much better off for the experience gained.

To speed delivery of the first FBM nuclear-powered submarine, an attack submarine, the *USS Scorpion*, then being built, was cut in half and a 130-foot midsection added to house the launching tubes. This piece of surgery helped produce a ready-for-sea FBM submarine—the *USS George Washington*—in three short years.

In both missile and submarine development, unprecedented problems were met and solved with a gusto that does proud our national tradition of free enterprise.

In September 1958 the first Polaris missile flight test was carried out from a land pad at Cape Canaveral.

On 20 July 1960, the *George Washington* successfully sent two missiles the full distance while cruising submerged off the Florida coast.

When the *George Washington* sailed from Charleston on 15 November 1960, the fleet ballistic missile weapon system was operational—three years ahead of schedule.

Role in Defense

DEVELOPMENT of the Polaris system produced its share of "firsts."

Polaris is the first long-range solid-fuel ballistic missile; it is the first operational ballistic missile to be guided by its own inertial guidance system; and, needless to say, it is the first and only missile fired from beneath the surface of the water.

Those of us directly connected with the Polaris program are justifiably proud of our baby. But none of us believes that it is the only, or ultimate, weapon.

Polaris cannot be used to fight so-called "brush fire wars." To protect ourselves and our friends we still need airplanes, aircraft carriers, ground troops with up-to-date weapons, the means to move troops far and quickly as the demand arises, and all the other



While Chief stands watch in forward torpedo room, other *George Washington* crew men (top) prepare for Polaris firing.

weapons and forces required for modern warfare.

Polaris is a major part of our Nation's deterrent force, but it has just one mission—to prevent full-scale nuclear war. All of the money, effort and time poured into the FBM program was purely and simply to develop a weapon we hope never to use.

Polaris is ready now. History may ultimately show that the timely development of this awesome weapon contributed significantly to the freedom and survival of our country and our way of life.

*The onrushing sweep of history and technology
accentuates the importance of*

The New Role of

ACCCELERATING trends in the world situation have focused increased attention on the capabilities of amphibious forces as a major instrument of our Nation's military posture.

In this world of constantly changing political conditions and rapid technological advancements, amphibious warfare has taken on an entirely new look. In addition to their many faceted responsibilities, amphibious forces have been endowed with a new importance. All this stems from an increased emphasis on mobility in our defense struc-

ture and a new use of the open seas for our outposts abroad.

Today our Nation urgently needs a strong Army and Air Force and a strong Navy and Marine Corps. It is essential that these services be strong in order to have a defense structure possessing sufficient versatility and flexibility to meet any assignment they may be called upon to accomplish. The Navy-Marine Corps team brings to this structure a unique mobility; further, this team engages in every type of warfare—land, sea and air.

Our Nation's amphibious warfare

Rear Admiral John S. McCain, Jr.



Amphibious Power



capability has been tested under fire. During World War II there were 61 separate amphibious operations. Additionally, there were 344 subsidiary landings to exploit successful operations. Of all the amphibious operations during World War II, not one failed. Again, in Korea and in Lebanon, amphibious assault was used very successfully.

World War II operations were conducted before the advent of the atomic weapon. Today such operations as the Normandy invasion, the amphibious assault at Okinawa, or the assault of Iwo Jima, with massive concentration of shipping, men and materiel, are not feasible with the threat of the employment of nuclear weapons. This has dictated major changes in the tactics and technique of conducting amphibious assault.

Yet the problems encountered while developing these new tactics and techniques were not peculiar to amphibious warfare alone. They were the same problems incident to normal land warfare.

Navy and Marine Corps amphibious forces have kept abreast of the rapid evolution of modern warfare. New techniques have been developed embodying the principles of dispersion, flexibility, and surprise to meet the atomic threat. New equipment has been developed. Techniques for the offensive employment of nuclear weapons have been adopted for the amphibious force, should the need arise. There is no doubt that amphibious warfare is as valid in a nuclear environment as any other form of war.

"Islands of Seapower"

THE urgency of the situation that our Nation faces today was pointed up by President Kennedy in his State of the Union Message: "—the tide of events has been running out and time has not been our friend."

The pattern of recent crises in the many areas of the world make it apparent that we must at least plan moves to any spot on the globe. These challenges demand teamwork of an Army, Air Force, Navy and Marine

Corps that can counter threats wherever and whenever they may appear.

Such military forces must be versatile. They must be able to move, any time, to reach any place on the globe. They must be self-sufficient, carrying with them their food, fuel, and ammunition—an inherent characteristic of seaborne striking forces. It is highly likely that they may be operating in places where no bases exist and where no help can be offered by friends and allies.

"Islands of Seapower" provide a ready answer. An outstanding use of such a concept is the deployment of the Sixth Fleet in the Mediterranean and the Seventh Fleet in the Western Pacific. In this connection, it was no accident of history that the Sixth Fleet with its amphibious capability was off Lebanon at the time of that crisis and the Seventh Fleet with its amphibious capability was ready to step in at the time of the Taiwan crisis.

"Islands of Seapower" are seaborne striking forces—mobile, powerful, flexible, and economical. They can be used around the periphery of a continent and are readily available when a crisis develops.

It is vitally important to remember that threats can be worldwide and they may strike on a new frontier at any time. The military forces to counter such threats must have area mobility and speed of reaction.

Area mobility and speed of reaction are inherent in (1) airborne or air-

lifted troops, and (2) amphibious forces deployed and on the spot. Some situations may require use of one, or both. More times than not, as history has proved, seaborne forces can and will provide the ready answer. They take their bases with them. They can hover indefinitely off a potential enemy coast, outside of territorial waters.

Airborne or airlifted troops have the capability of deploying rapidly to any spot on the globe in a matter of hours. These troops can seize, occupy, and defend certain specific objectives against certain specific types of enemy opposition. The United States demonstrated its ability to deploy troops quickly to the scene of trouble by airlifting troops from Germany through Adana, Turkey, to Lebanon in 1958. The British also successfully employed airlifted troops by transporting them from Cyprus to Jordan to stabilize the situation in that area.

The amphibious elements of the Sixth Fleet in the Mediterranean and the Seventh Fleet in the Pacific both have the ability to react quickly—as was demonstrated by the Sixth Fleet in Lebanon, and the Seventh Fleet in the Western Pacific.

Supporting the Landing Force

DURING World War II, the primary mission of the amphibious force was to engage the enemy in all-out war. Today, this has been expanded to include new missions.

The amphibious force is an ideal



Rear Admiral John S. McCain, Jr.
Commander, Amphibious Group Two

vious
Some
e, or
story
and
They
can
enemy
s.
have
y to
r of
upy,
tives
emy
non-
ops
air-
ough
958.
oyed
nem
the

the
and
both
—as
meet
t in

pri-
orce
out
ded
deal

EST



Amphibian tractors loaded with U. S. Marines head for an invasion beach in Korea as USS Archernar (foreground) loads LCVP's with men and equipment for operation.

instrument with which to apply graduated deterrence covering the entire spectrum of the application of military force—from a show of the flag through sub-limited, limited, conventional and general war.

Amphibious forces can apply exactly the right amount of pressure to meet any crisis. Such forces carry with them their own logistic and combat support which gives them long staying power. They can remain on station for long periods of time. They are self-sufficient. They carry with them heavy engineering equipment, artillery, and tanks. Powerful and flexible firepower from cruisers, destroyers and carriers is available to meet any need.

The amphibious striking force is the most complex of all our naval formations. It includes every type of naval vessel, weapon, and plane. This complex organization has one mission—to get the landing force established on the enemy shore under the most

favorable conditions for the accomplishment of their mission.

The landing force, generally speaking, is composed of Marines, but in extensive operations it can be Army or both. They are put ashore by vertical envelopment using the helicopter and over-the-beach assault from conventional landing craft.

The amphibious force supports the landing force in a way that might be likened to a tripod. The first leg is the transportation for the men, their equipment, and supplies to the objective area. The attack transport (APA) carries the bulk of the personnel. The attack cargo ship (AKA) transports much of the supporting equipment and bulk cargo. Landing vehicles and helicopters are carried in the landing ship dock (LSD). The landing ship tank (LST) carries tanks and heavy equipment. The landing platform helicopter (LPH), a converted carrier, transports the men and helicopters



During North African landings, Army tank rolls through bow doors of LST to join ground forces in World War II.

taking part in the vertical assault.

The second leg is the combat support for the landing force and the protection of it enroute to the objective area. Cruisers and destroyers provide antisubmarine defense, air defense, and shore bombardment support. The hunter-killer group with its carrier, destroyers, rotary-wing and fixed-wing aircraft is the primary antisubmarine element. Carriers provide close tactical air support, air reconnaissance, air defense, and air strikes against distant enemy positions. Under some circumstances additional air support, if needed, may be obtained from the Air Force.

Minesweepers are available to clear the waters of enemy mines. Frogmen and submarines are used for reconnaissance. All of these ships and commands provide the landing force with necessary combat support to ensure its success and give it long staying power.

The third leg of the tripod is logistic support. Tankers and various supply ships give the amphibious striking force the ability to operate in an objective area for extended periods without dependence on fixed bases.

The employment of such a com-

plex force requires careful and detailed planning. The amphibious operation is complicated by the need to coordinate naval and landing forces; the complexity of logistic support activities; the need for precise timing in air, naval gunfire, and artillery fire support; the need for effective command relationships; and the requirements of other operational factors peculiar to the operation.

The fact that the opposing forces are not initially in physical contact increases greatly the scope of unforeseen contingencies which may confront the attacking forces. Amphibious planning therefore must be continuous, concurrent, and coordinate.

Passive protective measures against atomic attack are also provided for in amphibious planning. Great emphasis is placed on unit separation, dispersion, and mobility. Increased mobility during the ship-to-shore movement and operations ashore allow for greater unit separation and provide for the necessary defense against atomic attack. The separation of landing beaches is such as to negate the destruction of more than one beach from one atomic weapon.

Future Trends

THERE have been considerable changes in the amphibious force since World War II. Even more changes are on the way for amphibious ships of the near future.

Presently under construction is a new amphibious assault ship known as the landing platform helicopter (LPH). This ship is being built from the keel up as an LPH and is designed to carry the men and helicopters used in the vertical assault.

The new attack transport (APA) will be in commission soon. It is designed to carry more troops at greater speeds and have the most modern command and control centers.

The new landing platform dock (LPD) is designed to carry troops, helicopters, and amphibious vehicles. This is one of the most versatile ships in the modern amphibious navy.

This new construction is designed to give the amphibious force greater lift capability, more speed, and im-

proved means of providing for command and control.

It is axiomatic that today's military forces must be versatile, mobile, self-sufficient, and economical to meet the many challenges imposed upon us. Deployed naval forces, employing the task force principle of organization, meet all of these prerequisites.

Naval forces can be tailored to form organizations involving every type of ship in one instance, through a graduated scale, to a single type ship at the other end of the spectrum. The many permutations and combinations to which the different types of ships lend themselves are the means by which the Navy builds up its task forces to cope with a particular mission and environment.

The open seas give us freedom to move far—quickly. Over these broad reaches our seaborne forces can move to suppress trouble at its inception, before it can grow into an all-out conflagration.

"During World War II there were 61 separate amphibious operations. Additionally, there were 344 subsidiary landings to exploit successful operations. None failed."



*Hunter-Killer aircraft and subs are teamed with
surface forces in the relentless hidden battles of*

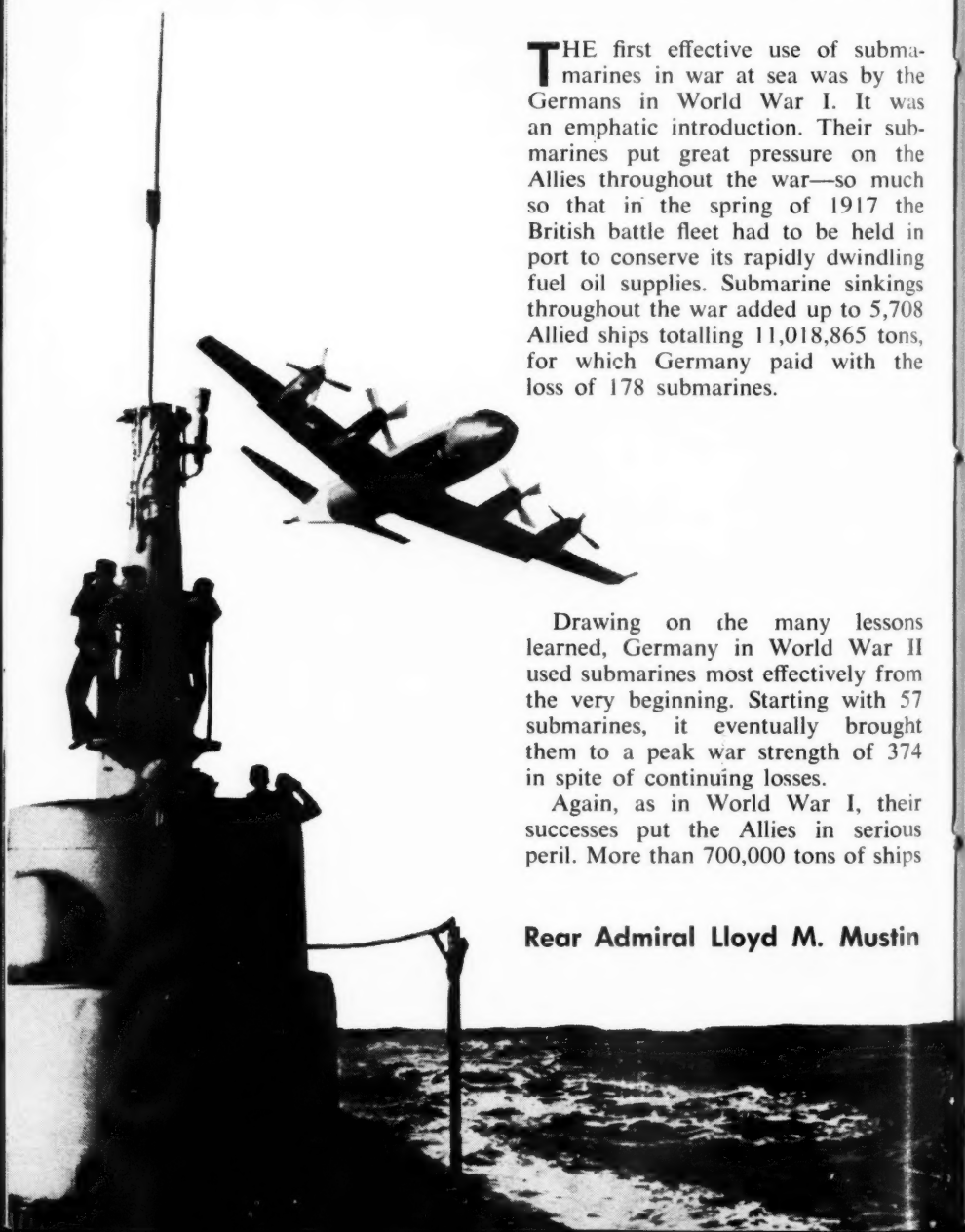
Antisubmarine V

THE first effective use of submarines in war at sea was by the Germans in World War I. It was an emphatic introduction. Their submarines put great pressure on the Allies throughout the war—so much so that in the spring of 1917 the British battle fleet had to be held in port to conserve its rapidly dwindling fuel oil supplies. Submarine sinkings throughout the war added up to 5,708 Allied ships totalling 11,018,865 tons, for which Germany paid with the loss of 178 submarines.

Drawing on the many lessons learned, Germany in World War II used submarines most effectively from the very beginning. Starting with 57 submarines, it eventually brought them to a peak war strength of 374 in spite of continuing losses.

Again, as in World War I, their successes put the Allies in serious peril. More than 700,000 tons of ships

Rear Admiral Lloyd M. Mustin



e Warfare

were sunk in June 1942 alone, and their total war toll was 2,753 ships amounting to 14,557,000 tons. (Compare these figures with the present total U.S. Merchant Marine of just over 3,000,000 tons.) As Sir Winston Churchill said, German submarines became the greatest single threat to the survival and ultimate victory of the Allies.

In the Pacific, the Japanese used their submarines somewhat less effectively but extensive measures had to be provided to combat them.

World War II Record

TRULY effective antisubmarine warfare first came into being in World War II, in operations by the Allies. It clearly defeated the Axis submarine campaign, but only after prodigious efforts which involved some 950 Allied ASW ships and 2200 ASW aircraft.

The opposition simply could not stand the remorseless pressure clamped on by the growing Allied ASW capabilities. Initially, the Germans had sunk an average of sixteen merchant ships for every submarine they lost, but as the vise tightened their effectiveness declined progressively. By July 1943 they were losing two submarines, complete with crews, for every single merchantman sunk—and the tide of the campaign had permanently turned.

In all the operations of both World Wars involving transportation of U. S.

military forces across the Atlantic or Pacific, only one loaded troop transport, the *Dorchester*, was lost to submarine action. Her sinking is remembered particularly for the loss of the four chaplains of different faiths, who gave up their life jackets to save four soldiers.

The opposition also has much to remember. World War II saw 781 German, 130 Japanese, and 85 Italian submarines sent to the bottom, for the staggering total of 996 submarines and crews lost.

During the Korean War, something like 99.6 percent of all the men and materiel used by the Allies came by ship, simply because there is no other way to accomplish the enormous overseas lifts required by modern war. While the possible submarine threat to this vast sea traffic was obvious, enemy submarine action was conspicuous by its absence.

Present Capabilities

AGAINST the potential submarine opposition existing in the world today, the U.S. Navy has a tremendous antisubmarine capability—the world's strongest by far, with no close seconds. This capability rests in forces which are deployed and ready for operations whenever and wherever ordered by the President. And these forces are thoroughly able to do today's job, against any of today's opposition, anywhere.

The only way to win against sub-

marines is to sink them. Against the elusive and dangerous submarine opponent, this takes a well-developed strategy, which must be designed to use every available United States advantage, and to enforce and multiply all the enemy submarine's disadvantages. ASW in its full sense therefore requires and includes a wide variety of naval operations.

Offensive operations against submarines must be part of the strategy, in order to cramp the enemy's initiative and freedom of action. This requires an assault upon the submarine in geographical depth, to expose him to detection and attack anywhere in the wide reaches of the seas.

The enemy's assault must be back-stopped at the target—be it a convoy, or naval task force, or missile-launch position—by close-in submarine-killing forces in the target area. It takes a diverse, many-armed organization, with a variety of special capabilities, for this strategy. No single ASW type or weapon or technique could do the job. And it takes a numerous force against the numerous enemy. Every lesson shows that in ASW there is no substitute for numbers.

Intelligence on enemy submarines, including strengths, tactics, and locations, is a big part of ASW. In World War II, as a result of such intelligence, we were often able to direct shipping away from the most dangerous areas, while at the same time sending offensive antisubmarine forces

into those areas for good hunting, using up-to-date knowledge of the submarine's latest methods and equipment. It was this kind of operation which saw the *USS England*, a destroyer escort, in one 13-day sweep sink five submarines single-handedly, with major credit for a sixth.

Present plans include provisions for the same sort of operations in the future, with technical and operational intelligence from an extensive supporting organization directly integrated with ASW operations.

Ships and Men

THE muscle of United States anti-submarine warfare strength is the ASW forces themselves—the ships, submarines, planes, and men who do the fighting. In these operating forces the regular Navy today includes some 370 ASW ships (including submarines) and 650 ASW aircraft, manned by 130,000 officers and men. This is almost half the ships in the Navy, and over 40 percent of the men of the naval operating forces. The Ready Reserves add an important 42 ships and 280 ASW aircraft to the totals.

Ships of the destroyer family are the most numerous in ASW forces. These versatile tigers of the sea have many fighting tasks; and in ASW operations they have several different roles, both in the close-in submarine-killing forces and in the assault-in-depth forces. Destroyers have the speed to maneuver with any fleet,



Rear Admiral Lloyd M. Mustin
Anti-Submarine Warfare Readiness
Executive, Naval Operations

and the staying power which lets them be where they are needed, when needed, day or night, in any weather.

Their radars and sonars can detect submarines surfaced or submerged; their weapons include a modern and deadly family especially tailored against submarines; and they are masters of the tactical control and coordination which keep the victim always off balance, outnumbered, and overwhelmed.

Aviation Role

ANTISUBMARINE aviation was one of the most effective Allied developments of World War II, and aircraft sank or took part in half of all submarine "kills." Their special contribution was their ability to cover large ocean areas in a short time, which fitted them especially well for "assault-in-depth" tasks. They caught most submarines surfaced or awash, found by eye or by radar.

Development of the snorkel reduced the aircraft's chances of finding submarines by such means. Nuclear power in the opposition's submarines would reduce those chances further, so additional highly specialized devices have been developed to provide aircraft detection of fully submerged submarines. With these and sophisticated new antisubmarine weapons, the ASW aircraft is again the submarine's deadly opponent.

A development since World War II is a series of closely coordinated tactics between ASW ships and aircraft which have been exceptionally effective in bringing the greatest strengths of each to bear. For example, a destroyer holding contact on a submerged submarine at considerable distance may vector an aircraft to weapon-drop position even though the submarine has not been picked up by the aircraft's detecting equipment.

These tactics make the capabilities of the trained surface-air ASW team far greater than the sum of the capabilities of the individual members.

Wherever there are destroyers on the antisubmarine job, there also should be specially-fitted and trained ASW aircraft—fixed wing or helicopter—in both close-in and assault-in-depth operations.

ASW helicopters are another new Navy development since World War II. They combine the aircraft's speed with the ability to hover and lower a sonar detecting device into the water. Thus they are an exceptionally valuable special-purpose tool, which can work independently or in coordination with fixed-wing ASW aircraft or destroyers or both.

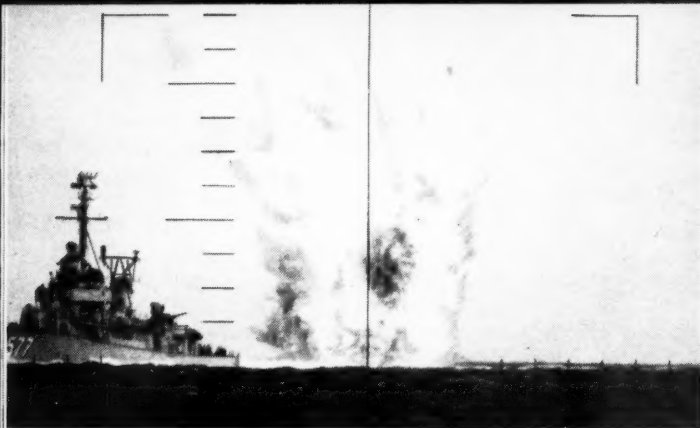
Hunter-Killer Action

AN antisubmarine Hunter-Killer (HUK) group consists of a number of destroyer types, usually about eight, and an antisubmarine aircraft carrier loaded with perhaps forty fixed-wing and helicopter ASW aircraft. The mobility and staying-power, characteristic of ships, enables the group to proceed to any selected sea area and stay there for as long as it takes to do their job. That job is to bring to bear a tremendous concentration of coordinated destroyer, aircraft, and helicopter ASW power.

HUK groups are specially suited to offensive operations against submarine concentrations, to sweeps through suspected submarine areas, and to covering particularly valuable forces and convoys. They were developed in the middle era of World War II specifically for operations of this kind, and their successes were a big factor in turning the tide against the German submarines. They will be needed for any future antisubmarine situation, and the Navy has them ready in its ASW forces.

Sub vs. Sub

AN especially interesting development since the war is the ASW submarine. The U.S. Navy submarine's special forte has always been sustained offensive operations in the



During training, submarine skipper sees two mortal enemies—destroyer and depth charge—in his scope.

"farthest forward" areas—far inside enemy-controlled waters, where other forces could remain only at great cost. Putting U. S. submarines there in an antisubmarine role adds a major dimension to basic strategy, and is a vital step in the fundamental approach of making geography work for us.

This additional ASW realm, which pits submarine against submarine in an underwater duel, is a natural extension of ASW operations. It fits into the basic Navy method of coordinated tactics by multiple units designed to "hit 'em high and hit 'em low"—or, in the tactician's language, to bring superior forces to bear on any opponent, under conditions of our own choosing.

An example of such developments are submarine-plus-aircraft ASW tactics, corresponding to the destroyer-plus-aircraft combination mentioned earlier, but adapted to a different set of strategic situations. Other newer and niftier tricks are in the bag.

Overcoming the Age Factor

THE Navy's ASW Forces include some of the newest and finest units offered by the state of the art, superior to anything known anywhere in the world. Small numbers of these are added every year, but the Navy also has some that are quite a bit older. For example, the majority of present first-line destroyers were built

in World War II programs—many of them saw action in the South Pacific in 1942—and the same applies to ASW submarines.

The Navy is the only service still using major equipment as old as this. These units are in their second and third generations of re-weaponing and re-equipping, a procedure to which ships in general lend themselves with advantage.

But this age factor is necessarily a matter of growing concern, because inevitably there will come a time when the older units can no longer do their job. The rate at which units are added has not kept up with the rate at which older ones are aging.

Another problem, equally pressing, was signalled in 1954 when the *USS Nautilus* became operational. This, the world's first nuclear submarine and first nuclear ASW submarine, was the forerunner of the growing number of more advanced models which have been evolved.

These potent members of the ASW team are unmatched by anyone else. But in exercises with other members of the team, these nuclear submarines have pointed up the much more difficult problem that our other ASW forces will have to face when nuclear submarines show up in the hands of the potential opposition. Since 1954 Navy planners have witnessed first-hand demonstrations of the imminent possibility of another swing of the

old weapon-counter-weapon pendulum as it affects the other necessary components of ASW forces. Much has been learned in these more than six years of operational experience.

Antisubmarine Research

RESEARCH has been geared to develop the new kinds of equipment, weapons, and techniques to enable the Navy to stay ahead of any prospective new adversary. The four most recent annual Navy budgets have provided more than twice as much for ASW research as they did in the early days of operations with our nuclear submarines. This has paid off handsomely, with developments more than equal to every need, and next-generation follow-ons well along in the program. When the opposition's nuclear submarines make their long-expected debut they will find that Navy ASW research has been anticipating them by quite a few years.

But the best products of research are no good until they get into the hands of the operating forces, in quantities needed to do the job. In ASW this is a fairly expensive matter, because the forces are necessarily large in number and the new price tags run high. Thus the main problem generated by the imminent

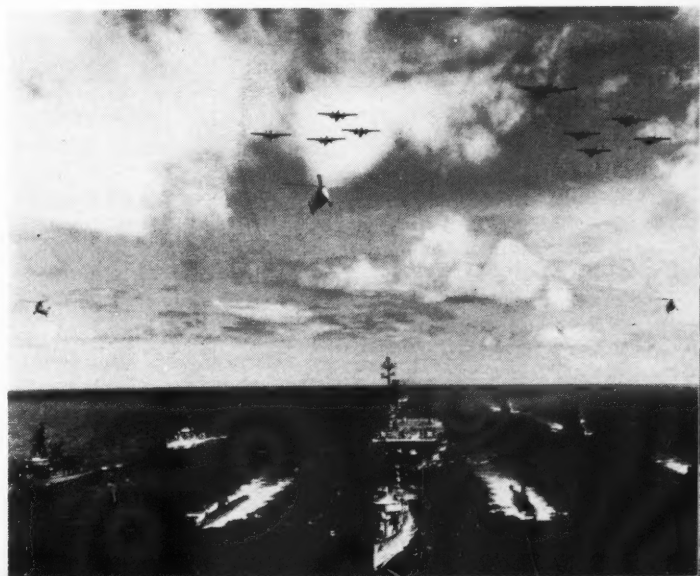
appearance of nuclear submarines in the forces of the potential opposition is not "What to do about it?" but instead, "How can we get the things we need into the operating forces in larger quantities—preferably 100 percent?" There are many challenges in this sphere—including the challenge to American ingenuity.

Improvements Sought

ASW spans every field of naval weapon, equipment, and vehicle technology—every scientific discipline, engineering field, production technique, every tactical and operational skill. In all of these areas, the Navy is looking not merely for something that can *do* a job, but for something which can do that job *better*, with gear which is simpler, cheaper, more producible and maintainable, and more thoroughly practical for use at sea.

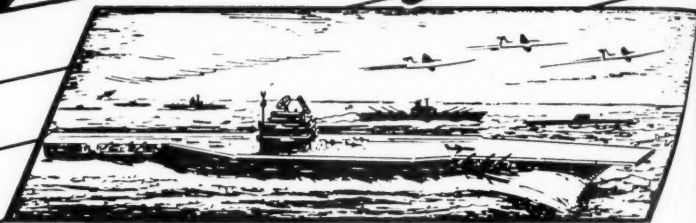
The entire range of ASW stands today as a most challenging subject in the field of modern warfare. There is plenty of room for all the thought, time, effort, money—and especially ingenuity—that this great country can devote to it. The field most definitely is not limited to Navy specialists. If you think you have some useful idea or innovation for ASW, let the Navy hear about it. We want it.

Antisubmarine teams like Task Force Alfa conduct hunter-killer operations in cooperation with land-sea-air units.



The rising tide of technological advance leads to

New Horizons



Vice Admiral John T. Hayward

NAVAL equipment has a long life. The long-term nature of this investment in major equipment and installations confronts the Nation with certain sobering facts.

Because of the long lead time investment in a shipbuilding program, present-day policy in research and development will largely determine naval posture in the next decade and beyond. At the same time, technology is evolving at an accelerated pace, and the concept of missions supporting national and alliance objectives changes with both political and technological variations.

In spite of these varying conditions, however, certain salient facts are sufficiently enduring to exert primary influence on naval development. These are:

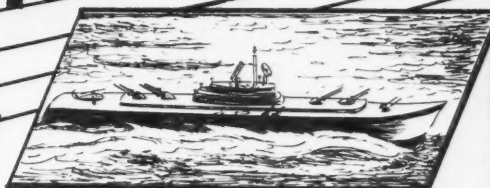
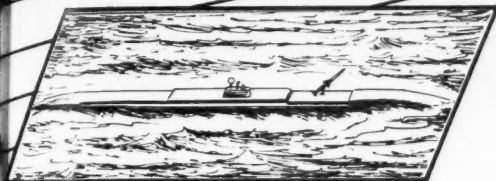
- Movement of forces and commerce on, under or over the seas does not violate sovereignty.
- Nationalism is still an evolving force in international relations. The rapidly increasing number of nations,

their mercurial policy vis-a-vis others, and the complexity of multi-lateral arrangement makes the freedom of the seas a vitally important national objective.

- The United States Navy is the only effective global naval force. Her traditional wartime naval mission of dominating or defeating other naval forces has changed. With the task force capability of concentrating or extending striking power, the mission has become one of projecting force against land objectives. This, of course, includes the function of keeping ocean communications open for use by forces of the United States and her allies.

- Ocean surface shipping is and will remain the most efficient form of accomplishing intercontinental and other long-haul transport needs. This is much more important to the free nations than to the Communist bloc. In the future it will become more important to the evolving African, Asian, and archipelago nations.

FOR THE NAVY



The above considerations make mandatory certain courses of action—namely, the need to

►Prepare to counter and contain any aggressive threat to our global naval superiority.

►Develop the posture of encouraging and defending ocean commerce. If ocean commerce of the Communist bloc becomes importantly large, it will become hostage to a dominant surface naval force.

►Continue development of naval forces to protect sea communications in the face of submarine and air threats, both sides being aided by improved surveillance.

►Continue to deploy the largely invulnerable portion of the deterrent force at sea.

The specific of Navy research and development programs cannot be based entirely on evaluation of anticipated missions. As stated initially, naval equipment has a long life expectancy. One problem faced today is obsolescence of a large number of World War II ships.

Obsolescence, however, may not be the most accurate term inasmuch as the concepts of individual ship function have covered almost a complete

cycle. They were built in or shortly after World War II for conventional functions. Since then they have been adapted to nuclear, thermonuclear war. Now they are being reconsidered for the conventional functions. In other words, the utility of some units is more effected by wear and tear than by the type of obsolescence associated with design.

While recognizing the long term and continuing nature of naval force improvement, the Navy research and development program must necessarily strike a nice balance between improvements to our existing inventory and the introduction of new weapons systems. Carefully managed, these two demands are neither conflicting nor contradictory.

For example, the exploration of new component possibilities may lead to improvements in existing fleet units as well as to new weapons systems. It is not generally known, but experiments in launching the booster stage of ballistic-type missiles was conducted about one year prior to the adoption of submerged launch as the Polaris objective. The intent of this early experiment was to provide a short-range missile for the numerous conventional submarines. This helped crystallize the Polaris concept toward the submerged launch of solid propellant boosters.

Exploratory Development

THE foregoing example illustrates an important principle in Navy research and development. It is an unstated but nevertheless real policy that we will develop components and explore the feasibility of new ideas before committing ourselves to a weapons system. The Navy budget reflects this. When end-items are carefully identified over the past several years, it becomes evident that 40 to 50 percent of the research and development budget is allocated to the area which is now identified as "exploratory development."

Some areas which the Navy considers worthy of this type of exploration include:

- New sources of energy and of energy conversion.
- New vehicles, including the very deep diving submersible, the surface-piercing hydrofoil, and the over-water ground effects machine which we call a hydro-skimmer. These vehicles, when equipped with suitable sensors, arms and payload, will not only enhance performance of existing tasks, but may well lead to new concepts of use of naval force.
- Automation and self-adoptive controls are being investigated to assess the possibility of obtaining more efficient performance per ton of ship and per man.
- Optimum use of the 70 percent of the earth's surface covered by oceans is under study. This includes

sea launch, free selection of orbital parameters, and the possible uses of toxic propulsion materials which would be dangerous in land launches.

- Earth satellite navigation and communication systems (including use of the moon), radio astronomy and radiometer applications.

Warfare Systems

IN a multi-threat naval force, the identification of many weapons systems becomes difficult. It is, however, possible to delineate the gains which the Navy aims to achieve within the next few years.

In total war the Polaris system would be capable of covering all targets from a much larger ocean area (increased 10 to 50 times). Not only will missiles be of longer range with inherent penetration capability, but the Polaris submarines will also be more capable and more difficult to detect. The manned carrier-based bombers and similar types which have reconnaissance and surveillance capabilities will have significantly better performance. The A3J will penetrate at great altitude and speed without radar assistance. The A2F will penetrate "on the deck" in all weather.

In limited or conventional war the strike force includes its amphibious element. In the 1961-65 period the amphibious force will utilize the helicopter in addition to its over-the-beach landing vehicles. This permits units ranging in size from the reconnaissance com-



Vice Admiral John T. Hayward
Deputy Chief of Naval Operations
(Development)

pany to the regimental combat team to be deployed over a very significant area in the rear of the normal beach defense.

From 1965 on, the amphibious elements will probably utilize the vertical take off aircraft to extend both range and logistic support capability. (See "When VTOL Aircraft?", June 1961 DIGEST.) Surface force flexibility in approach and selection of the landing area, the capability of a surface force to move to a troubled area prior to belligerence without creating international problems, and its ability to land Marines in depth constitute a very real war-limiting force.

In either total or limited war it is plain that the surface naval forces must penetrate to within range of objectives, and must stay there long enough to accomplish the task. The threat of missile and aircraft attack has been anticipated in the Terrier, Tartar and Talos systems. A comprehensive system will evolve from these.

The naval surface forces will be tied together by the Naval Tactical Data System to provide force-wide control of fire, economical use of ammunition, and counter-countermeasure capability. Airborne Early Warning radar information and air-to-air missile systems will be integrated to

provide optimum use of components over sea or over land areas of interest.

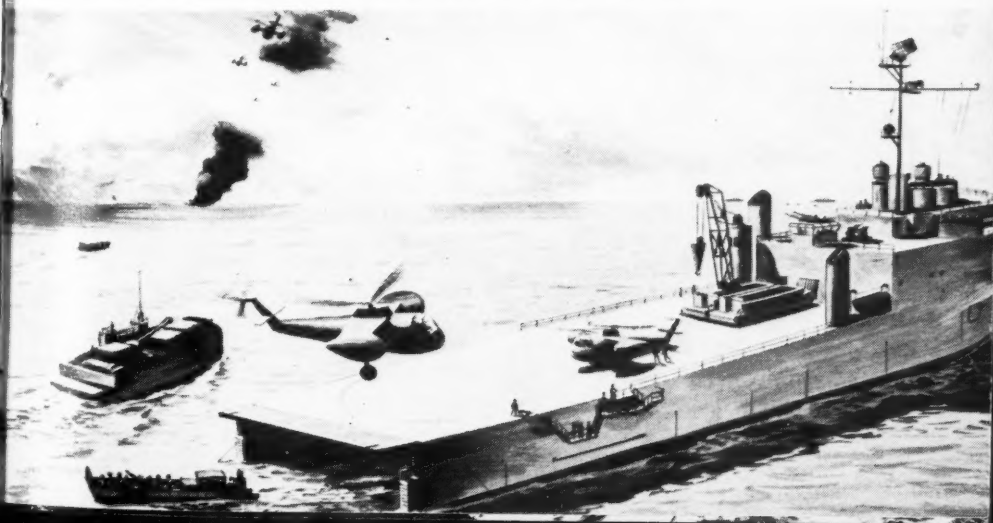
When the sea is to be used as a base of operations and as a vital transport link, there will exist a continuing problem to counter the threat of submarines over tremendous areas.

Long-range efforts in support of undersea and anti-submarine warfare are directed toward solution of two types of problem.

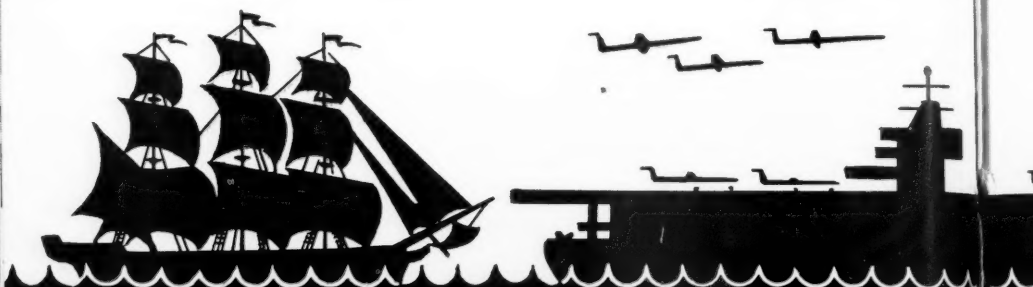
The first of these is simply to obtain a much more complete understanding of the ocean environment. One aim is to obtain sufficient knowledge to permit prediction of acoustic and other conditions. In ground force terminology this is equivalent to knowing and choosing advantageous terrain. Another is to examine all possible sensing and communication techniques within the ocean and through the air-water interface. Yet another is to explore the most feasible and economical methods of placing large areas under surveillance.

The second problem area is to exploit the knowledge obtained of the ocean in perfecting weapons and vehicles compatible with improved detection ranges and sensing techniques. The Navy also will exploit this information for coordination of air, surface and subsurface forces.

To put Marines on an enemy beach, the Navy has a great variety of amphibious ships to speed boatloads of men ashore or land them by helicopter.



From the era of sailing sloops to aircraft carriers and nuclear subs, the order "Land the Landing Force" has signalled the onset of



Launching U.S. Power From

The Saga of U.S. Combined Operations Since 1775

WHEN Washington took command before Boston in 1775, a critical powder shortage threatened dissolution of the patriotic Army and the Revolution scarcely before echoes of Lexington and Concord had faded. At this fateful moment, the General became acutely aware of "our weakness and the Enemy's Strength at Sea." Just as weakness at sea threatened this Republic with stillbirth, so would it be fatal to our national existence today.

Britain held overwhelming advantage of mobility, flexibility, and continuous support inherent in strong naval power. To divert enemy supplies to his own needy troops, Washington ordered several small schooners outfitted. "Washington's Fleet," the first organized American naval force, was manned by Army officers and soldiers who had been seamen. During fall and winter, 1775-76, this small squadron captured some 30 ships whose cargoes sustained the

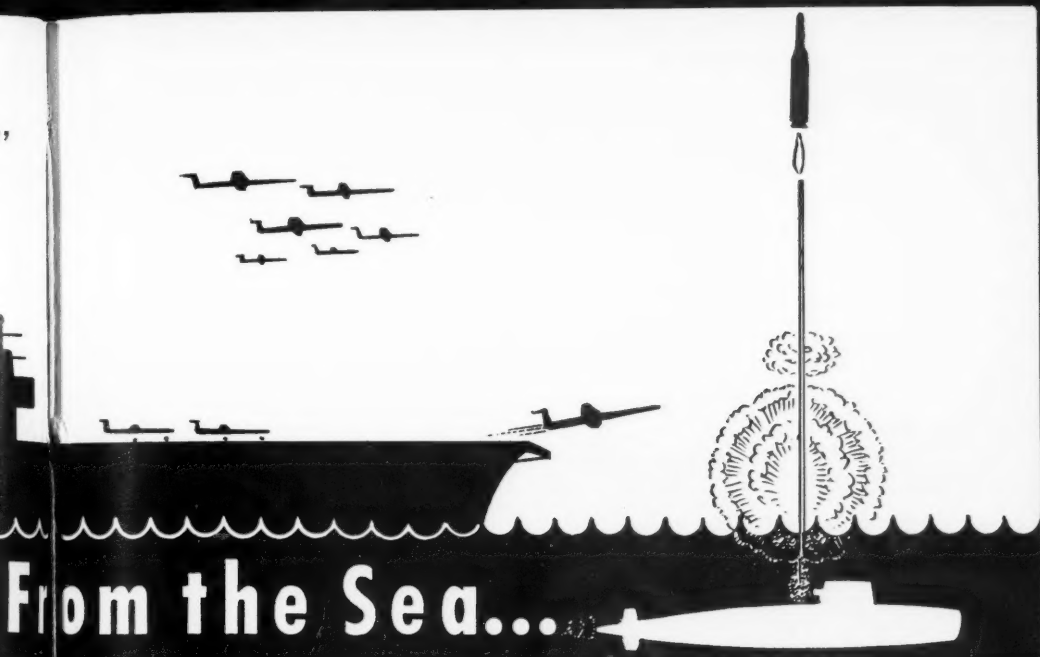
Army. One prize, the ordnance brig *Nancy*, contained munitions that it was said would have taken the colonies eighteen months to make.

Washington's few schooners could not seriously dispute control of the seas. When the enemy elected to evacuate Boston, his army embarked and sailed, escorted by men-of-war, to strike elsewhere. Washington could not interfere.

Congress passed naval legislation, 13 October 1775, which brought the Continental Navy into existence. This Navy never numbered more than a handful of ships, but in it served men who molded glorious naval traditions—John Paul Jones, John Barry, Nicholas Biddle, to cite a few.

Aid to Victory

THE sea opens the world. Continental ships and privateers prevented the isolation of America. They carried essential supplies and showed the



Rear Admiral Ernest M. Eller (Ret.)

new "Stars and Stripes" in foreign ports. Jones, Conyngham, Wickes brought the war to Britain's home waters. *Bon Homme Richard's* stirring victory over *HMS Serapis* and Captain Jones' thundering "I have not yet begun to fight" are golden pages in American history.

Under the guns of *Providence* and *Wasp*, over two hundred sailors and marines landed on New Providence Island (3 March 1776) to capture British forts and precious munitions, an amphibious assault that has had a host of successors. From New Providence, to Fort Fisher in the Civil War, to Normandy, Inchon, and Lebanon, the dramatic order "Land the Landing Force" has signalled the climactic moment in launching United States power from the sea. It is this successful transport, landing, gunfire and air cover, and logistic support of troops which projects our military strength—sea, air, land—in support

of United States national objectives.

Combined sea-land strategy made possible the two decisive victories of the Revolution—Saratoga and Yorktown. On Lake Champlain in 1776 a small squadron, manned by the Army, was defeated by the British. However, the Americans so delayed the enemy that invasion was postponed a year. Washington used this time to strengthen the Army which defeated Burgoyne at Saratoga.

The French Navy under Admiral de Grasse played a decisive role at Yorktown (1781). De Grasse defeated a British fleet off Chesapeake Capes and control of the sea passed to the Allies. French ships blockaded Lord Cornwallis' army entrenched at Yorktown. Cut off from support or evacuation by sea, and assaulted by the armies of Washington and Rochambeau on land, Cornwallis surrendered. Independence was won. "Naval superiority," wrote Washing-

ton, "was the pivot upon which everything turned."

Gaining Freedom of the Seas

POLITICAL independence was a reality, but in the next thirty years the United States waged three wars to win her rights on the sea. The Navy ceased to exist after the Revolution while America's seaborne commerce expanded. Then, as now, and as long as man trades across vast oceans, commerce demands naval protection. American shipping was victimized by France, Britain, and Mediterranean pirates.

Congress in 1794 authorized construction of six frigates—the first ships of the United States Navy under the Constitution. Two still float—*Constitution* ("Old Ironsides") in Boston and *Constellation* ("The Yankee Racehorse") at Baltimore—reminders that freedom is not won or held easily.

The U.S. Navy had its baptism of fire in the quasi-war with France (1798-1801) fought entirely afloat. *Constellation* and Captain Thomas Truxtun earned imperishable glory. By masterful ship handling and gunnery, Truxtun won a spectacular battle with the heavier gunned *L'Insurgente* (1799) and next year hammered *La Vengeance* into defeat. France agreed to settle honorably.

Outrages against Americans by the North African pirates cried loudly for naval protection. In the war with Tripoli (1801-1805), Commodore

Preble, Captain Decatur and ships bearing memorable names—*Intrepid*, *Enterprise*, *Nautilus*—won respect for our flag. From these formative years to the present powerful Sixth Fleet, the U.S. Navy has been a force for peace, a friend and shield against aggression in the Mediterranean.

The naval phases of our second war with Britain (1812-1815) were fought on ocean and lake. As in the Revolution, Britain used its great naval strength to blockade and ravish our coasts. Nevertheless, the small U.S. Navy won stirring ship duels. Notable was Captain Isaac Hull's victory in *Constitution* over *HMS Guerriere* when the American frigate gained its sobriquet, "Old Ironsides."

Commodore Oliver Hazard Perry's victory in the Battle of Lake Erie (10 September 1813) caused the British position in the Northwest to collapse. As the battle smoke cleared, Perry penned his historic message: "We have met the enemy and they are ours." The Navy transported troops to the Canadian shore, where Perry led a cavalry charge at the Battle of the Thames.

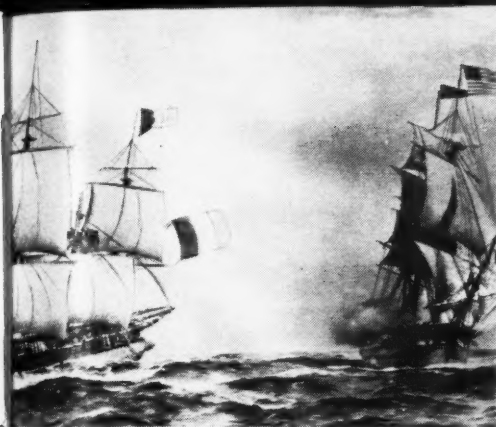
Lake Champlain, avenue for an invading army and its supplies, was key to Britain's planned "knockout blow" from Canada by 14,000 troops. One year almost to the day after Perry's triumph, Commodore Thomas MacDonough, displaying intrepid leadership and skillful ship disposition, soundly defeated a powerful British



Rear Admiral Ernest M. Eller (Ret.)

Director of Naval History and

Curator, Navy Department



Captain Thomas Truxtun's masterful ship handling and gunnery led *Constellation* to victory over heavier-armed *Insurgente*.



Captain Stephen Decatur and his men helped crush menace of Barbary pirates as they boarded gunboats in Tripoli.

squadron. The Lake Champlain "key" remained American—the invading army retreated.

A small naval squadron, under Commodore Patterson, delayed the British landing, provided cover for American troops, and added a naval battery in support of General Jackson's final victory at New Orleans. The Navy served the Nation well but lacked strength to lift Britain's devastating blockade.

Technological Changes

THE United States grew rapidly between the War of 1812 and the Civil War, and commerce, assured of naval protection, prospered. Scientific advance foreshadowed the unbelievable technological revolution through which we live.

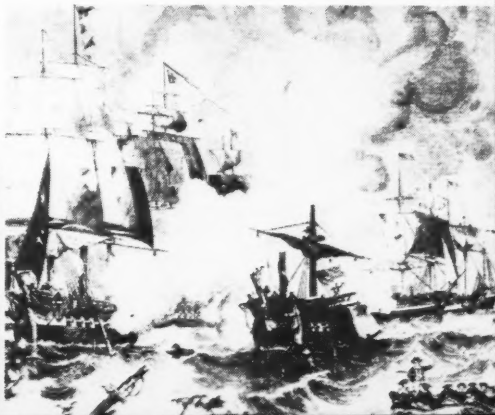
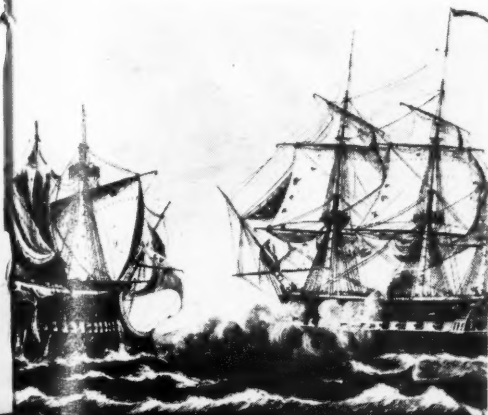
During War of 1812, *Constitution* and Captain Isaac Hull won lasting fame by defeating *HMS Guerriere*.

The Navy championed the use of steam as it has led the way in nuclear propulsion. Captain M. C. Perry, best remembered for negotiating the treaty with Japan, was an early advocate of steam. The United States had the first steam and screw-driven warships.

Lieutenant John A. Dahlgren's experiments led to the Dahlgren gun—America's first scientific naval cannon. From the Dahlgren to Talos and Polaris there is a direct succession—a manifestation of the Nation's ceaseless search for the best sea as well as land-launched weapons that science and American industry can devise.

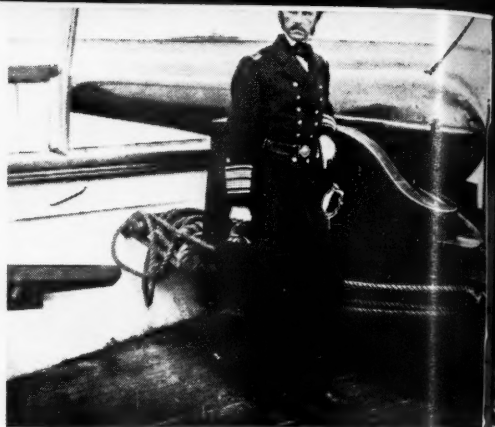
An exploring expedition under Lieutenant Charles Wilkes established the existence of the Antarctic continent. At the Naval Observatory, Lieutenant Matthew Maury, "Pathfinder

Commodore Perry's famed dictum, "We have met the enemy and they are ours," summed up 1813 amphibious assault.





Captain Matthew Perry, early advocate of steam propulsion, arranged a treaty that opened Japan to American trade.



RADM Dahlgren, father of naval ordnance, stands near early 11-inch Dahlgren gun, first scientific naval cannon.

of the Seas," undertook his profound studies on wind and ocean currents. Before mid-nineteenth century, Maury and Wilkes had pointed the way for Peary's discovery of the North Pole in 1909; for Byrd's exploration in the Arctic and Antarctic; for Deep Freeze; for the nuclear submarine *Nautilus* to reach the North Pole under the ice cap; and for *Triton* to circumnavigate the globe submerged.

War began with Mexico in 1846. The Navy blockaded both enemy coasts, neutralized strong points with gunfire, transported troops, guarded sea communications, and in combined operations secured California. Operational high point was the skillful amphibious assault covering the landing of 10,000 troops in one day below Vera Cruz (March 1847). Naval sup-

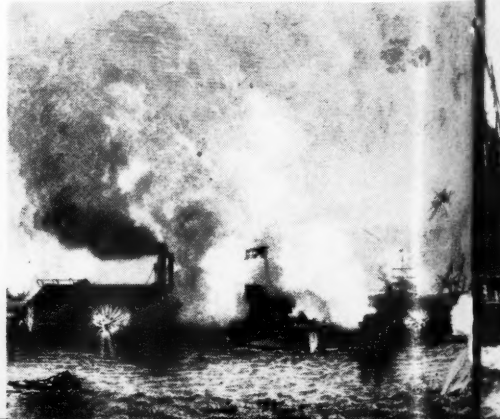
port continued as soldiers and marines pushed to the "Halls of Montezuma." The experience and the amphibious tactics developed in Mexican waters were soon called for in the Civil War.

North vs. South

IN THIS Centennial year one must reflect that out of the struggle emerged a united nation which is, and has been, a bulwark for man's dignity and freedom. It was our first modern war, and one in which it may be said without detracting from the long, valorous land campaigns, that sea power was a key to their success. The Federal Navy was small at the outset, but it gave the North control of the seas; the South had no navy.

Naval bombardment of Fort Fisher led to fall of Wilmington, N. C., last southern supply port, in final year of Civil War.

For the first time in history two ironclad ships, *Monitor* and *Merrimac*, met on 9 March 1862 to herald new naval era.

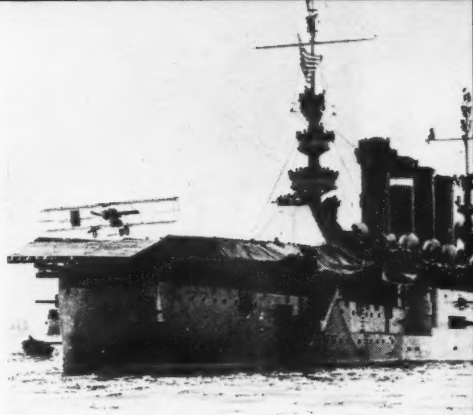




Admiral Sampson's blockaders at Santiago decimated Admiral Cervera's fleet as it sortied from port, 3 July 1898.

Northern naval strategy included blockade, seizure of ports and coastal areas by combined amphibious attack, land action support, and western river operations to split the Confederacy. Initially Union ships available to blockade some 3000 miles of Southern coast were inadequate, but the blockading force, which strangled the South's economy, grew to more than 450 vessels. European goods in quantity flowed into Northern ports, while the South's economy starved. The colossal blockade also discouraged European intervention.

North Carolina sounds were favorite havens for privateers. The Federal Navy moved quickly to eliminate these sanctuaries. A naval squadron, Flag Officer Stringham (August 1861), bombarded Forts Hatteras and Clark



By landing a Curtiss pusher on board USS *Pennsylvania* in 1911, Eugene Ely led the way for carrier-based jet pilots.

at Hatteras Inlet into surrender as troops went ashore under the protection of the ships' guns. This first Union and naval victory caused Northern morale to soar.

Flag Officer Du Pont captured Port Royal Sound, South Carolina (7 November 1861) as a key base for blockading ships; Flag Officer Goldsborough and General Burnside took strategic Roanoke Island (February 1862). The last port of entry for Confederate supplies, Wilmington, North Carolina, guarded by powerful Fort Fisher, was captured in the largest amphibious operation of the war (January 1865).

Federal naval domination of sounds and coast not only drastically restricted blockade running, but compelled Confederate defenders to with-

First American ships joined British Grand Fleet during World War I at Queenstown, Ireland, led by USS *Wadsworth*, flagship.



While her planes are away bombing Tokyo, a carrier's 40mm gun crew are busy repelling attack by enemy planes.





Aerial and surface ship bombardment poured tons of shells on Iwo Jima before amphibious assault troops landed.

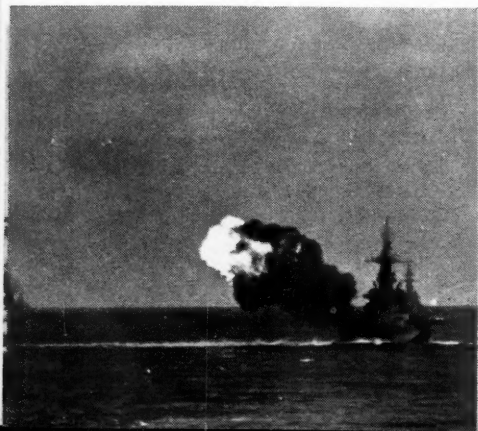


Ulithi provides supplies and much-needed rest in December 1944 for ships such as USS Ticonderoga (foreground) in Pacific.

draw inland out of range of ships' artillery. General Lee wrote: "Wherever his fleet can be brought, no opposition to his landing can be made . . . We have nothing to oppose his heavy guns."

Coordination between Federal Army and Navy was close on the Potomac and other Eastern rivers. General McClellan's army went by water to Fort Monroe (April 1862), and was supported by gunboats on the James and York rivers. When forced to abandon his attempt against Richmond, he withdrew under the guns of the river squadrons. Late in the war, General Grant made excellent use of this same mobility and river control to move troops, shift bases, and outflank Lee.

Battleship USS North Carolina shells are launched against main defenses of Okinawa, D-Day minus three.



Earlier on the western waters Grant had learned well the value of water transport and vigorous naval support. Ironclad gunboats spearheaded his campaigns which divided the Confederacy, and reopened the Mississippi to northern commerce.

Gunboats under Flag Officer Foote forced the surrender of strategic Fort Henry on the Tennessee River, and helped take Fort Donelson on the Cumberland. Surrender of Island No. 10 to the Navy, coupled with Grant's victory at Shiloh, sealed the fate of the upper Mississippi.

Meanwhile, Flag Officer Farragut, following intensive mortar bombardment, steamed past the withering fire of Forts Jackson and St. Philip guarding the approaches to New Orleans.

On board the mighty battleship Missouri, peacefully anchored in Tokyo Bay, World War II officially ended 2 September 1945.





Navy landing ships unload men and equipment in amphibious operation at Inchon, outflanking North Koreans.



Line of refugees filing on board Navy's LST-901 pass under sign reading, "Your passage to freedom, Haiphong, Vietnam."

The city surrendered to Farragut. Loss of New Orleans, largest and wealthiest city in the South, was a stunning blow from which the South never recovered.

While Vicksburg dominated the Mississippi from high bluffs, complete control was denied to the Union. On 4 July 1863, besieged by land and water and without naval strength to contest the Federal gunboats, Vicksburg surrendered. "The Father of Waters," wrote Lincoln, "again goes unsexed to the sea."

By 1864 the only important Gulf port remaining in Southern hands was Mobile. Forts Morgan and Gaines, a small Confederate naval force built around the ironclad *Tennessee*, and torpedoes (mines) blocked Mobile Bay. Farragut, in *Hartford*, brought his fleet against these formidable defenses (August 1864). Farragut's heroic "Damn the Torpedoes, Full Speed Ahead," seized victory from what could have been disastrous defeat. The Navy neutralized Mobile and pinned down Confederate strength which could have been used against General Sherman, besieging Atlanta.

Torpedoes, Subs, and Ironclads

THE South, committed to the defensive by lack of sea strength, struck back valiantly. Ingenuity supple-

mented meager resources. Torpedoes (mines) were developed for harbors and rivers. These "infernal machines" destroyed or damaged some 40 Union ships. The Confederate Navy employed lethal *David* torpedo boats, to which the versatile modern destroyer may trace lineage. A true submarine sank an enemy vessel for the first time in history—presaging the vast

Navy Combat Artist Griffith Coale offers this conception of air attack on two Japanese carriers in Battle of Midway.



impact of the submarine today.

The Confederacy turned to ironclads to compensate for lack in numbers. Salvaged *USS Merrimac* became a casemated ironclad, *CSS Virginia*. The North countered with the single turreted *Monitor*. The classic first battle between ironclads (9 March 1862) heralded a new naval era. The Civil War also saw the first United States use of balloon reconnaissance from ships—a small beginning of the Fast Carrier Task Forces which helped crush Japan, and keep the peace on our troubled planet.

Confederate commerce raiders struck hammer blows at Northern commerce. Raphael Semmes in the famous *CSS Alabama* took 69 prizes before being sunk by *USS Kearsage* off Cherbourg, France (June 1864). *Shenandoah*, unaware of Lee's surrender, raised havoc with Yankee whalers for weeks after Appomattox.

Although the South fought with no want of bravery or inventive genius, the North's ever-increasing military strength, unhampered logistics, and overwhelming naval superiority applied on the sea, the rivers, and in sustained support of the Union Army's ground offensive could not be denied. The end was inevitable.

When the Civil War closed, the United States Navy was the most powerful afloat. Rapid demobilization, as after all our wars, and public apathy took their toll. By 1881 there were no modern ships in the Navy. Naval regeneration began in 1883 with authority to construct four all-steel cruisers with advanced armor and armament, and of domestic steel—a major impetus to the growth of today's American steel industry.

Spanish-American War

WHEN destruction of *USS Maine* in Havana touched off the Spanish-American War (1898), the Nation had a modern Navy of respectable size capable of fighting in the Western Pacific and Caribbean. This con-

flict had as its objective the liberation of Cuba. The Navy's mission was threefold—blockade Cuba, support land operations, and destroy Spanish naval forces to free the army for operations overseas.

At Manila Bay, Admiral Dewey brought the steel Navy into action for the first time, and in decisive victory (1 May 1898) made the United States a Pacific power.

Half way across the world, Admiral Sampson's force blockaded Cuba and bottled up the Spanish Fleet in Santiago. Marines landed at Guantanamo Bay, and Sampson covered the landing of 17,000 Army troops who moved on San Juan Hill and Santiago. When Admiral Cervera sortied from the harbor (3 July 1898), his force was destroyed. These victories that won the sea brought the war to a quick end.

The Spanish-American War projected the United States into a world power with overseas interests and territories requiring a strong Navy. The round-the-world cruise of the "Great White Fleet" (1907-1909) engendered good will and increased American prestige. To meet the increased responsibilities the Navy concentrated on improvements in gunnery, battle tactics and doctrine, and integrating two major new developments—the submarine and the aircraft. *Holland*, the U.S. Navy's first submarine, joined the Fleet in 1900, and in 1911 the first naval aircraft was purchased.

The momentous potential of the radical departures which would carry naval power under and over the sea began to take effect. The submarine came close to winning for Germany in World War I, as it did in World War II, and is the greatest menace we now face from the Soviet Union. In United States' current arsenal, the marriage of the nuclear submarine with Polaris missile, and the fast aircraft carriers with missile armed planes, are mighty deterrents.

Global Wars

DURING World War I, the U.S. Navy faced the task of convoying and transporting hundreds of thousands of American soldiers and vast supplies through submarine waters. American destroyers, submarine chasers, and naval aircraft met the challenge. A division of U.S. battleships operated with the British Grand Fleet to preclude surface raids on sea communications. The battleship also provided gun cover as the vast North Sea mine field, including almost 60,000 American mines, was laid as a submarine barrier.

Naval aviation expanded in World War I until it included more than 2,000 planes. Operating from overseas bases, naval aviators flew almost 800,000 miles on bombing and patrol missions, attacking German submarines and installations.

The period between World Wars was dominated by the quest for permanent peace through international armament limitation agreements. Ships were scrapped by the United States while paper plans were torn up by some nations.

Aviation assumed greater importance in naval operations. The first carrier joined the Fleet as the Navy continued to integrate this new strength into sea power at a time when extremists predicted that the aircraft had ended the usefulness of navies. Fleet exercises placed increasing stress on amphibious techniques which before long would be put to a test of undreamt magnitude.

As the threat of expansionist Japan and Germany crystallized, naval construction stepped up. War again came to Europe in 1939, and with the collapse of France, the tempo of United States preparedness increased.*

*This short article can only touch the highlights of World War II sea operations. Morison's fourteen volumes, *United States Naval Operations in World War II* and Furer's *Administration of the Navy Department in World War II* are the most authoritative and readable writings on the Navy's great role.

In the Navy's Atlantic war, as in World War I, German U-boats again menaced movement of troops and equipment, took heavy toll of shipping, and threatened collapse of operations overseas. Air attacks added their toll and problems for the Navy.

Convoys quickly came back into use. Antiaircraft guns went on ships as fast as they could be produced. Aircraft added their speed and vision, as the Navy integrated them effectively into the Fleet.

The desperate need was for more of everything—yesterday—more ships, more planes, more guns, more radar and sonar. Gradually, as new construction brought these, the submarine paid dearly for earlier successes. The seaborne ship-plane team won the battle for the Atlantic. Allied navies destroyed some 780 German and 85 Italian submarines. Naval protection shepherded mountains of war materials across the sea lanes into the United Kingdom, the Mediterranean, the Middle East, and North Russian ports.

Unlike World War I when French ports were available, the Allied armies in World War II had to fight their way onto the European continent and Africa. Complex amphibious operations, larger than any before attempted, swept across the seas.

Hitler's fortress began to crack in November 1942 when the Allied navies poured troops into North Africa. Battleship, cruiser, and destroyer bombardment and naval aircraft strikes preceded the landing and supported the soldiers ashore. Sicily was invaded in July 1943, followed by the move to the Italian mainland in September. Launched from the sea, our troops surged into Southern France, 15 August 1944.

Inevitable collapse of Germany began with the mightiest amphibious operation in history—the Normandy Invasion. Well over 2,000 U.S. Navy ships and craft joined Allies in the movement from the United Kingdom



Carrying 16 Polaris missiles, every FBm submarine packs more destruction than all airborne bombs during World War II.

to the beaches of Western Europe. Preceded by intensive minesweeping and bombardment, and covered by aircraft and naval gunfire, the troops stormed ashore on D-Day, 6 June 1944. Warship fire laid far inland with deadly accuracy hampered the Germans in bringing up reinforcements to beachheads. The logistic build-up for the Army's breakout and drive to the German heartland was facilitated by ingenious artificial harbors on the open Normandy coast.

Pacific Campaign

ACROSS vast Pacific distances the war took on a different complexion. Japanese submarines never became a serious problem, but enemy carrier and surface ship strength did. Amphibious operations were mounted, from New Guinea to the Aleutians, against fanatically defended islands and coral atolls rather than large land masses as in the European theater.

Exploiting the temporary sea control gained by the Pearl Harbor attack, the Japanese moved rapidly into

the Philippines and Southwest Pacific. The few Allied carriers, cruisers, destroyers, and submarines offered heroic resistance against overwhelming odds.

America's morale lifted when *USS Hornet*, Admiral Halsey, launched Army bombers under Lt. Col. Doolittle to strike Toyko (18 April 1942). Then in May at the Battle of the Coral Sea, the first naval engagement fought entirely by carrier-based aircraft, the Japanese drive was halted.

One month after Coral Sea came the Battle of Midway (4-6 June 1942)—one of the decisive battles in history. The smaller U.S. carrier force, Admiral Spruance, administered a shattering defeat which cost the enemy four carriers and most of his combat-experienced pilots. Japan never held the initiative after Midway.

The bitter struggle for Guadalcanal and adjacent waters began with the landing of the 1st Marine Division, 7 August 1942. Thus started the chain of amphibious movements and desperate combat in which the Navy carried American marines and soldiers up through the Solomons, the Marshalls, the Marianas, to the reconquest of the Philippines, Iwo Jima, Okinawa, and to the Japanese surrender on board *USS Missouri* in Tokyo Harbor, 2 September 1945.

Fast carrier task forces, ever increasing in strength, ranged the broad Pacific, clearing the way, closely supporting landings and troop actions, striking with devastating effectiveness against enemy shore targets, shipping, and aircraft.

No element of United States sea power played a more prominent role in defeating Japan than submarines. They scored heavily against enemy combat vessels and accounted for over half of the Japanese merchant shipping destroyed. In addition they rescued over 500 Allied aviators from the sea. While submarines methodically cut Japan off from raw materials, the United States hold on the

ocean highways granted our forces uninterrupted supply on each succeeding step toward victory.

New escort ships, families of specialized landing craft, sophisticated electronic equipment, rockets, proximity fuzes, and controlled atomic energy were but a few of the major developments becoming operational during World War II. In the years since, the Navy has stood in the forefront of remarkable technological ferment, assimilating what is new and better into the country's flexible sea strength—jet aircraft, helicopters, large angled deck carriers, nuclear propulsion, guided and ballistic missiles, solid fuels, earth satellites.

Cold War Era

VICTORY in World War II did not bring the hoped-for peace. For collective security, free nations have joined together as in NATO and SEATO. These confederations, in which the members are bound to each other by the sea, have placed great responsibilities on the Navy. Combat capabilities and readiness to defend our Allies in limited or nuclear war must be maintained.

Since the mid-1940s the Free World has faced aggression on widely scattered fronts. In some instances, as in Greek waters, Jordan, Guatemala and Nicaragua, and Formosa Strait, the mere presence of the "Grey Diplomats" has stabilized difficult situations—illustrating the unique ability of

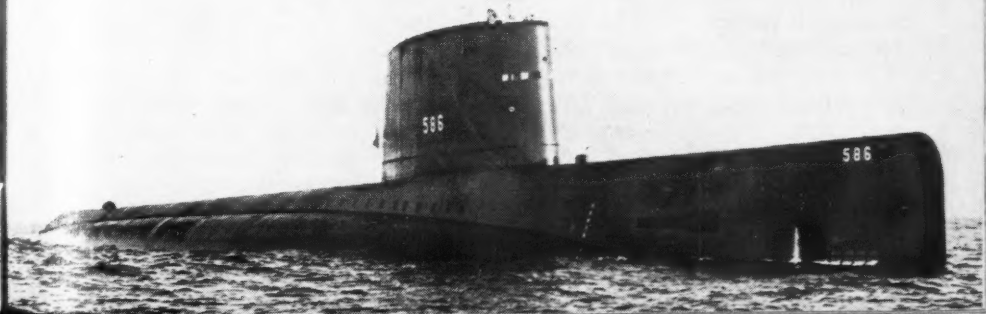
power based afloat to exert pressure without international complications. The Berlin Airlift, evacuation of Viet Nam and the Tachen Islands, and Lebanon required a more direct application of naval support and lift capability.

The Cold War erupted into the hot Korean War, 25 June 1950. Acting through the framework of the United Nations, the United States military forces were soon committed. The Navy tightly blockaded the Korean Peninsula, denying the sea to the North Koreans while we used it freely. Six of every seven men carried to Korea went by ship; for every ton of supplies airlifted to the Far East 270 tons came by water.

Naval gunfire and carrier aircraft gave effective close support to the troops, and blasted enemy targets throughout the war. The classic amphibious operation gave mobility for the "end-run" to Inchon which outflanked the North Koreans and put them to route.

The uneasy Korean truce, events before and since, bear witness that our resolute purpose and vigilance cannot be relaxed. The international climate and our global commitments for mutual defense increase the need to control the seas and make the words of John Paul Jones, written almost two centuries ago, particularly cogent today: "In time of peace it is necessary to prepare, and be always prepared for war by sea."

World's largest submarine, 447-foot, 5900-ton nuclear-powered USS Triton, designed to be Navy early warning station, circumnavigated the earth submerged.



Army Redstone Propels Navy Astronaut

Project Mercury Astronaut In Successful Space Flight



CULMINATING two and one-half years of intensive planning, testing of equipment and training of men, the National Aeronautics and Space Administration's Project Mercury achieved all planned objectives when Commander Alan B. Shepard, Jr., USN, became the first American astronaut to make a flight into space on 5 May.

Hurting 115 miles into space and 302 miles downrange from Cape Canaveral, Florida, in 15 minutes, the Mercury capsule was slowed by parachute on its downward path, and almost instantly recovered by helicopter from the sea. Much data of significance to future space flight was obtained as CDR Shepard experi-

enced environmental extremes ranging from weightlessness to gravitational forces 11 times normal.

Son of retired Army Colonel and Mrs. Alan B. Shepard, Sr., CDR Shepard was born in East Derry, New Hampshire, and studied at Admiral Farragut Academy. He was graduated from the U. S. Naval Academy in 1944, served on destroyers in World War II, and gained his flight wings in 1947. Prior to being selected for Project Mercury, he made several high altitude tests, and contributed to research on carrier landing techniques and experiments with in-flight refueling systems.

A modified version of the Army-developed liquid-fueled Redstone provided the initial boost for America's first manned space flight. Developed at the Army Ballistic Missile Agency, Redstone is produced by the Chrysler Corporation, Detroit, Michigan, under Army contract. It first proved its long-range capability when it powered the composite Jupiter-C more than 3,000 miles down the Atlantic Missile Range in 1956. On 31 January 1958 a modified Redstone served as the first stage of the composite vehicle which carried Explorer I into orbit.

Redstone also was the first U. S. ballistic missile to successfully employ an inertial guidance system; it was the first large U. S. ballistic missile to be fired by troops; and it provided the boost when the first heat-protected nose cone was fired into space and recovered. Redstone now is deployed overseas, having joined the NATO Shield Force in Europe in June 1958.



From the Commandant of the Marine Corps

AN OPEN LETTER

To Our Comrades in Arms:

MARINES don't win wars! We never have. Wars are won by the combined efforts of all the Armed Services and the civilians who back them up. Like the other Services, the Marine Corps helps win some of the battles.

Our principal mission is to provide ready air-ground landing forces for service with the Navy fleets. The fighting troops who close with the enemy are only a part of these landing forces. Marine fighter and attack planes, helicopters and other support aircraft habitually form a vital part of the team. In this way we are assured of timely support, particularly during the more difficult assault phase of amphibious operations. Various service and support units are provided to complete the landing force.

Amphibious operations are tricky. Troops aren't just put into boats, amphibious tractors or helicopters and pointed toward the beach. Careful planning is required. The proper combinations of ships, airplanes, landing craft, fire support, and assault and support troops are needed.

The Marine Corps job is to provide the landing force, the equipment and some of the know-how. The Navy provides men, ships, and various forms of air, submarine, surface, and logistic support as well as their own brand of know-how. In addition the sailors see to it that the bullets and beans we need get ashore.

We practice vertical assault but Marines in large numbers do not parachute into combat. Our parachute requirement is limited to small reconnaissance and pathfinder units. Marines are trained for air-lifted operations, however, and can go anywhere transport aircraft can take them. It doesn't make any difference what mode of transportation we use to get at an enemy. The assault may be launched from a ship at sea or from somewhere on the ground after we are ashore. The important thing is to be better than the enemy when we get there.

We look at it this way; our men are dedicated to country and Corps. This is the common denominator of all Marines—on the land, in the air, and on the sea. All Marines are trained as fighting men; they must excel in the fundamentals of our common fighting profession. And finally, they must always be ready, willing and eager to do the best job they know how whether in peace or in war.

Simply stated, our mission is to be ready—ready to fight potential enemies anywhere, anytime, with any weapons and on any terms.

DAVID M. SHOUP
Commandant of the Marine Corps

*Determined young recruits
tempered by rugged training
and imbued with esprit-de-corps
are prime factors in*

WHAT MAKES A MARINE?

Major General S. S. Wade, USMC

THE U. S. Marine has, through the years, become a personage of many varied descriptions ranging from "strange phenomenon" to "sea-going bellhop." Ex-Army author Marion Hargrove has even charged us with having web feet. Perhaps the accuracy of any description, however, depends to a great extent on the viewpoint of the describer.

There are those who insist that the U. S. Marine is a product of the same pool of American manhood from which all U. S. fighting men are drawn—and they're dead right!

The logical question follows: "Then what makes a Marine a Marine?"

Even those of us who have worn the Globe and Anchor for the majority of our lives find that this is not an easy question to answer with specifics. We believe, however, that at least three major factors are combined to mold the end-product:

- The type of American youth who decides to enter the Marine Corps;
- The knowledge and skills imparted to him by the Marine Corps;
- That intangible thing known as *esprit-de-corps*.

Certainly, there are other considerations, but let's isolate these three and define them simply as: *the individual, training, and pride in service.*



The Individual

THE typical Marine recruit of today has passed his eighteenth birthday when he raises his right hand and swears to defend the Constitution of the United States "against all enemies, both foreign and domestic." Usually, he has completed his sophomore year of high school, sometimes more. He'll stand about 5-feet-10 and weigh in close to 160 pounds.

In dealing with the mysterious questions of the Army General Classification Test (given to all Marines)

he'll attain a score of 106 to 112. The odds are 7 to 3 that he's more familiar with the smog of the city than the odors of the barnyard. He feels obligated to serve his country and has elected the Marine Corps as the branch of the Armed Forces in which to fulfill that obligation. Otherwise, he wouldn't be "coming aboard" since, today, all Marine recruits are volunteers.

This, then, is our "raw material," which the recruiting sergeant recognized as a potential Marine.

Training

THE recruit who enlists west of the Mississippi River is sent to the Marine Corps Recruit Depot in San Diego, California. If he comes from the eastern half of the United States, his destination is Parris Island, South Carolina. But regardless of which Recruit Depot receives him, the objective is the same—to make of him a *basic* Marine. Later he'll become a member of a fighting team, but right now the effort is directed toward teaching him as an *individual*.

Immediately upon arrival at the Depot, he is shown to the Receiving Barracks. There he executes a few vital forms which the Corps will later use in providing him with pay, medical care, and the like. He joins a group of about 70 other young men and they file out of the barracks. Still in civilian clothes, they are herded into what vaguely resembles a formation by one of the Marines who assisted them with the forms. That's the last they see of him, and they stand in anticipation of what comes next.

A precisely blocked brown campaign hat approaches them from across the parade ground. Under it walks a man whose appearance would lead you to believe he was not born—but issued. This man is lean, leather-lunged, and sun-tanned to a deep mahogany. On his arms are four or five prominent stripes, and vertical creases stab down the front of his

shirt and trousers to a pair of glistening shoes. He is not announced—he introduces himself. The impact of this first meeting is never forgotten. It goes something like this:

"All right, you people. Look up here! Feast your eyeballs on me. Take a *good* look at me because I'm your Drill Instructor. My name is Gunnery Sergeant Salt. For the next 12 weeks I'm gonna' be with you morning, noon, and night. I'm gonna' spend every second of it making you into Marines. I'll be your mother, father, sister, brother—and all your problems will be my problems. And we're gonna' solve those problems—*my way!*"

"Cooperate; keep your eyes and ears open and your mouths shut; and we'll get along. You goof-off and I'll be right on your backs. Whenever you speak to me, the *first* word you say is 'Sir'.

"You people are gonna' learn courtesy and discipline like you know your own names. Remember that. You don't move until I say, 'Move.' And when I say, 'Move'—you *MOVE!* Remember *that!* Now face to the right—follow me!"

The ragged formation, still in civilian clothes, follows the Gunnery Sergeant. They enter a long, low building appropriately labeled *HYGIENIC*. Some two hours later they emerge on the far side, but you would recognize none but the Gunnery Sergeant.

Civilian clothes are gone—either mailed home or given to the Salva-



Major General S. S. Wade, USMC

Assistant Chief of Staff, G-3

Headquarters, U. S. Marine Corps



The critical eye of the Drill Instructor scrutinizes every detail of equipment laid out by a platoon of fledgling Marines preparing to stand formal inspection.

tion Army. The long hair has been shorn to GI specifications. Each man has had a *thorough* shower; been clad in a suit of dungarees (the Marine Corps' fatigue uniform); been carefully fitted with boots; become bur-

dened with a sea bag full of gear to maintain and use in training; and done it all "by the numbers." He begins to feel like a Marine, but he isn't one. Not yet. This is only the beginning.

Intensified Training

THE following twelve weeks are eventful ones. The *minimum* training, as prescribed by the Commandant of the Marine Corps for Recruits (*see page 63*), doesn't take into account those long hours crammed in by the DI beyond those appearing on the schedule. From 0500 until 2100, the training goes on. Every hour is carefully calculated, regardless of subject matter, to further instill that all-important ingredient—discipline.

Pressure is relentless, and for a reason. It teaches a man to think

"A fleck of dust on a rifle . . . distresses the Drill Instructor extremely. He makes no effort to conceal displeasure."





Trainees experience every possible type of obstacle on close combat course designed to test endurance and reflexes.



They use newly adopted pugil stick, above, to learn bayonet fighting, and run obstacle course, below, to test agility.



straight and respond properly when the going gets rough. This is only fair to the recruit, for the stresses of combat certainly constitute pressure. The more he learns of pressure in training, the less it will affect his actions on the battlefield. The Chinese put it this way, "The more you sweat in peace, the less you bleed in war." Recruit training subscribes to this philosophy.

Inspections come every day—repeatedly. A fleck of dust on a rifle, or an improperly folded blanket, distresses the Drill Instructor to a great extreme. He makes no effort to conceal his displeasure.

The rudiments of the profession of arms are all taught step-by-step and always there is the tough physical conditioning. Fat melts away and is replaced by real muscle. Lightweights find themselves gaining pounds and strength. The Boot learns to do things he never thought he could do.

He learns something about himself, too—that he has a remarkable reservoir of *self-discipline*, the ability to control his own emotions and desires. He uses this self-discipline to enable his mind to absorb the vast amount of instruction presented to him. He learns the history and traditions of his Corps, Americanism, guard duty, field sanitation, first aid, military courtesy, Marine Corps missions, and always—drill, discipline, and physical conditioning.

Each day's instruction is predicated on that received the day before, and as it progresses the recruit catches on. He finds that, to a Marine, a rifle is his best friend. It's a rugged piece of gear—but it receives his tender care. He respects it, for someday it may save his life and, without doubt, it will be one of the tools used in his Country's service.

He declares the Creed of the United States Marine. This is a meaningful Creed, and it includes a solemn promise to hit, for it is only the hits that count. Smoke and noise mean

nothing. Hours of dry firing (known to Marines as "snapping in") loosen tight muscles and sharpen the sight picture.

Then the recruit finds himself on the big range where he can "line 'em up and squeeze 'em off" for a solid week at ranges up to 500 yards. During this week, he collects valuable data on winds, the effect of light, and proper sight settings for *his* rifle.

He competes with other men in his platoon for high score and the final day—Record Day—comes all too soon. At the first crack of dawn, he "cranks off" the first of 50 rounds which he will fire that day. He's on his own as he works his way from standing to prone and from 200 yards back to 500. Should he remember all he has been taught, he'll qualify. If he pulls a 220 out of a possible 250, he'll be awarded the coveted crossed rifles and wreath of the Expert Rifleman.

While on the range he also fires the pistol and the automatic rifle, and he does well. But it is *his* rifle to which he applies the master touch.

And More Training

AFTER marksmanship training, he returns to the routine of "Boot Camp." New matters are taken up and the already acquired skills are polished. Now he learns of another way to use his rifle—bayonet fighting. To a Marine, the bayonet is part of the rifle—a part to be used when the going gets rough or when silent killing is required.

One way he learns is to fight a fellow recruit with a pugil stick. This is a rifle-length stick used in training bouts. Men slash and jab at one another just as if they were out for blood. But the stick has padded ends and the opponents wear heavy gloves and football helmets to prevent injury. With this protection, the bouts are entered into with full enthusiasm, aggressiveness, and determination to win. The ever-present DI declares the

RECRUIT TRAINING SYLLABUS

Subject	Hours
Information Program	10
a. Code of Conduct	(2)
b. Uniform Code of Military Justice and Discipline	(3)
c. Character Guidance	(3)
d. Information Lectures	(2)
Mission, History and Traditions, Customs and Courtesies of the U. S. Marine Corps	9
Interior Guard Duty	5
Military Sanitation, Personal Hygiene	4
First Aid	3
Marine Corps Pack	6
Shelter Tents	1
Clothing and Equipment	5
Drill	70
Parades and Ceremonies	11
Inspections	20
Physical Conditioning	60
Swimming (Qualified swimmers may receive other instruction during this period.)	10
Bayonet, Hand to Hand Combat	14
Mechanical Training, Weapons	20
Marksmanship Training	110
Total Minimum Hours	358

winners of the various bouts.

During the final phases, there are field meets, with the various recruit platoons competing for honors in such events as relay races, rope climbs, disassembly and assembly of weapons, shelter tent pitching, and the like. Greater proficiency is acquired in all matters, but the Drill Instructor is never satisfied. He demands absolute perfection—always, in everything.

By now the Boot approaches this goal, but he never quite attains it. He can never rest on his laurels for there is always something new to learn, something old to learn better. His shoes have taken on a high gloss, and his uniform begins to hold the

Creed of the United States Marine

"My Rifle"

THIS is my rifle. There are many like it, but this one is mine. My rifle is my best friend. It is my life. I must master it as I must master my life. My rifle, without me, is useless. Without my rifle, I am useless. I must fire my rifle true. I must shoot straighter than my enemy who is trying to kill me. I must shoot him before he shoots me. I will . . . My rifle and myself know that what counts in war is not the rounds we fire, the noise of our burst, nor the smoke we make. We know that it is the hits that count. We will hit . . . My rifle is human, even as I, because it is my life. Thus, I will learn it as a brother. I will learn its weaknesses, its strength, its parts, its accessories, its sights, and its barrel. I will ever guard it against the ravages of weather and damage. I will keep my rifle clean and ready, even as I am clean and ready. We will become part of each other. We will . . . Before God I swear this creed. My rifle and myself are the defenders of my country. We are the masters of our enemy. We are the saviors of my life. So be it, until there is no enemy, but Peace!

Courtesy of Leatherneck
Magazine of the Marines

Marines not only subscribe to the rifle creed but learn in great detail how to care for and handle their "best friend."

proper creases. He is ready for the big day—Graduation—and it finally arrives.

There is a review, and as each recruit executes "Eyes, RIGHT" he realizes that he is now, at last, a United States Marine. He'll be glad to tell you this and he'll claim some credit for himself. But he realizes that he got here only through the magnificent performance of his Drill Instructor.

For the fear of the DI has passed, somewhere along the line, and it has been replaced with admiration, gratitude, and respect. One Marine with experience, knowledge, determination, and skill, has created other Marines from 70 young Americans. These 70 have weathered a rugged transition from boy to man, and they'll never be the same again.

Yes, they are now Marines—but what we call basic Marines. Each man is disciplined, drilled, and trained as an individual. He knows a few small arms and uses them well. He can handle himself under extreme pressure and he has acquired a tremendous pride. Some might think he is ready to branch out—to go into the special fields of aviation, artillery, tanks, and the like. But the Corps doesn't think so.

Training Regiments

MARINES are first, last and always *amphibious riflemen*. To make this basic Marine into an amphibious rifleman, and to teach him how to function as part of a fighting team, we send him to one of our Infantry Training Regiments for four weeks of combat training.

There are two such Regiments. One nestles in the canyons and rolling hills of Camp Pendleton, California. The other was carved out of the dense pine forests and swampland of Tidewater North Carolina at a place called Camp Lejeune. The Marine's origin again determines to which one he will be sent.

At these places, the Marine be-

comes a member of a four-man Fire Team which is, in turn, part of the Marine Rifle Squad. He fires virtually every weapon of modern infantry combat, and makes up, emplaces, and fires demolition charges. He loads and fires flame-throwers, stitches targets with machine-gun bullets, "kills" tanks with rocket launchers, and throws every kind of hand grenade. He learns fire and maneuver through squad exercises with live ammunition.

Machine guns are fired inches over his head as he learns to crawl through obstacles toward his objective. He is schooled in Marine close air support, naval gunfire, and the mysteries of cargo nets and landing craft by which he travels from ship to shore. He learns of the vast machine that backs him up in amphibious assault, but he knows that he, and other Marines, will have to root out the enemy with rifle, bayonet, and grenade. This fact gives him a special feeling of comradeship, for he finds out that the Marines on his right and left will always be there—that he'll never face the enemy alone.

Working always as a member of a team, our Marine goes on cross-country combat and reconnaissance patrols. Fortified positions are attacked and "towns" are captured. The team learns to function in the world's best camouflage—darkness—and it finds that weather, good or bad, has absolutely no effect on the rigid schedule.

In four short weeks, they are no longer *basic* Marines. They are the finished product, ready to take their places in the Fleet Marine Forces as professionals. But they are never finished with training. Whether they go to sea aboard cruisers and carriers, attend a formal school, or become clerks in the pay office of a large base, they are required to remain proficient in those skills they acquired during their first four months in the Marine Corps.



Realism is introduced into final days of training when each Marine learns how to knock out pillbox with live grenade.



With rifle at ready, Marines "mop up" a village with grenades as part of their realistic training in close-in combat.



Trainee flushes out an enemy "sniper" hiding inside ruined building.



In strenuous, realistic maneuvers, Marines train for any sort of battle environment, as here in heavy snows.

Pride in Service

AS those four months have passed, the Marine has acquired the third item in his makeup—that intangible something known as *esprit-de-corps*. Years ago, some obscure Frenchman defined this as an exaltation of one's own corps and a looking down on all others.

The Marine may not define *esprit-de-corps* this way. In fact, he may not seek to define it at all. But he is aware of it. He can't see it, but he can *feel* it, and he does see positive signs of it. It pulled him through in times of adversity, and he knows it was often all that pulled other Marines through in other times.

This has been so since fighting men began to band together and pride themselves in the accomplishments of their predecessors. For the Marine, it is traceable from the beaches of the Bahamas in 1776 to the frozen hills of Korea. It includes Belleau Wood, where Marines wore olive drab and fought as a Brigade of the famed

2d U. S. Army Infantry Division. It includes Okinawa, where two Marine Divisions and a Marine Regimental Combat Team served as a part of the Tenth U. S. Army. And in Korea, the Marines again found good company with the other elements of the Eighth U. S. Army, to the consternation of a mutual enemy.

And so it is that no small part of the history of the Marine Corps parallels the history of the Army. Hence the *esprit-de-corps* of the two must be similar in many respects. For Marines, though members of a separate service within the Department of the Navy, can serve with the Army when the President directs. It has been, and will continue to be, a good relationship.

AS Marines, we are a proud lot, to be sure. If we weren't we wouldn't be Marines. But more important, we are a determined lot, dedicated unswervingly to God, Country, and Corps—in that order.

"He learns of the vast machine that backs him up . . . but he knows that he, and other Marines, will have to root out the enemy with rifle, bayonet, grenade."



The "amphibious soldiers" known as Marines maintain constant readiness for

AMPHIBIOUS WARFARE

In The Nuclear Age

Lieutenant General J. C. Burger, USMC

DO amphibious operations have a role in the warfare of the Atomic Age? We Marines are convinced that they do.

Nuclear weapons have not made any type of military operations impossible—but they have made large troop concentrations unprofitable. As a result, it has become necessary to devise ways and means of reducing mass.

The Marine Corps has solved the problem by developing a new concept of amphibious assault—vertical envelopment. This technique, which makes maximum use of speed, mobility, flexibility and fire power, provides the means for making a successful landing over hostile beaches.

Following the advent of the atomic bomb which rang down the curtain on World War II, it became necessary for the Navy and the Marine Corps to reduce radically the surface ship-to-shore movement of troops and supplies during the assault phase of amphibious operations. This surface

method of transport was too slow. The nuclear threat now makes it necessary to eliminate the great concentrations of shipping characteristic of World War II amphibious operations. Both of these weaknesses have been eliminated by using helicopter-borne assault forces, launched from widely dispersed shipping.

The principal characteristic of the modern amphibious task force is speed. Navy-designed troop transports, adapted for helicopters, are able to keep pace with a carrier striking force. In addition, conventional aircraft carriers and landing ships have been converted to accommodate helicopter operations.

Task Force in Action

THE amphibious task force is a self-contained unit, capable of defending itself against air, surface or submarine attack.

First step in an amphibious operation is the preparation of the objective area by long-range carrier air-



craft delivering nuclear munitions. While the task force is still over 1,000 miles from the target, its planes begin to hit the objective area. This 1,000-mile radius of attack moves inland as the task force approaches for the assault. Light attack planes join in the neutralization of enemy defenses when the task force is approximately 500 miles from the objective area.

The greatest threat to the task force is enemy nuclear weapons. Our own attack planes, therefore, concentrate on wiping out this enemy capability. Maximum attention is given to bases from which missiles and aircraft can reach either the task force or landing area. Troop concentrations, communication routes and industrial installations are treated as secondary targets.

The assault phase of an operation today reflects a major change in am-

phibious concept. The assault is no longer against a single defensive line, or a beach. It is against an area. Regardless of the strength of its coastal defense system, no country today can afford to assume that it enjoys an effective defense against amphibious assault. The vertical envelopment concept allows too wide a choice of landing areas.

Amphibious forces are no longer as dependent as previously upon the availability of beaches. The threat of attack along any portion of a coast line forces the enemy to deploy his forces widely.

Today's landing forces are capable of delivering tremendous shock effect through surprise, speed and depth of initial penetration. This type of operation is ideally suited to a link-up with forces from the Army's airborne divisions. It also provides the means by which a powerful, effective fighting

force can be concentrated within the enemy's defensive perimeter.

Marine assault forces are landed in their entirety, tactically and logistically, inside the objective area. It is no longer necessary to fight over the ground to reach these objectives; the helicopter permits approach from any direction.

The helicopter has reduced dependence on slow, vulnerable, water-borne, ship-to-shore operations during the assault phase. Its employment has also reduced the need for beach exit roads and bridges, which used to restrict the choice of landing areas.

Marines are now able to land under sea conditions which heretofore would have prevented a surface ship-to-shore operation. Employment of helicopters also enables our forces to concentrate or disperse rapidly, by-passing enemy strength to attack flanks or rear. In addition, the choice of inland terrain is as unlimited as that of the coast line for initial assault. The helicopter also reduces dependence on long lines of ground communications, and speeds up resupply operations.

The helicopter's most serious limitation is its inability to lift the heavy equipment required in support of assault forces. In all amphibious operations of any size, tanks, self-propelled guns, engineer equipment and bulk supplies must still be brought in over the beach. This combination of ground and air techniques represents the Marine concept for the employment of

amphibious forces in the nuclear age.

Deployment of Forces

TODAY'S Marine Corps is deployed in a state of readiness for any type of war. The core of its combat organization consists of three Marine Divisions and three Marine Aircraft Wings. They constitute the bulk of the two Fleet Marine Forces which are assigned to the Atlantic and Pacific Fleets respectively.

The 2d Marine Division and the 2d Marine Aircraft Wing, which constitute the largest part of the Fleet Marine Force, Atlantic, are located in North Carolina. One battalion landing team and one attack aircraft squadron of this air-ground team is afloat in the Mediterranean with the Sixth Fleet. If needed, the remainder of this division and wing is ready to get under way in a matter of hours.

The 1st Marine Division is located at Camp Pendleton, in Southern California. The other half of this Pacific Coast air-ground team, the 3d Marine Aircraft Wing, is stationed at nearby El Toro. These units are also capable of loading out for combat operations in a short time.

Overseas, the 1st Marine Brigade, composed of a regimental landing team and a Marine aircraft group, is stationed in Hawaii.

On Okinawa and in Japan, the 3d Marine Division and the 1st Marine Aircraft Wing, minus those units which make up the brigade in Hawaii,



Lieutenant General J. C. Burger, USMC

Commanding General

Fleet Marine Force, Atlantic

Framed in opening of amphibious personnel carrier, infantrymen dash ashore after an artillery barrage.



are positioned on the edge of a vast area where the flames of conflict may be ignited at any time.

Special Groupings

IN ADDITION to these more commonly known organizations, the Marine Corps uses other groupings of forces which are created to satisfy a particular need. A good example is the Marine Air-Ground Task Force. This term does not refer to a force of any specific size, but to the identity of various assault organizations.

One such unit is the Marine Expeditionary Unit, often called simply an MEU. This is a landing force composed of a battalion landing team and an aircraft squadron. It is usually commanded by either a lieutenant colonel or a colonel, who may be either a ground officer or an aviator.

The basic combat unit of a battalion landing team is the infantry battalion. Organized into a Headquarters and Service Company and four rifle companies, it is one of the basic components of the Marine Division. With the support elements attached to turn it into a battalion landing team, it normally has a strength of 65 officers and 1,535 enlisted men.

Should the battalion landing team be used to conduct an independent, or semi-independent operation, it would normally be further reinforced by Force Troops units to provide it with heavier support.

The Marine Corps' Force Troops

are designated as Force Troops, Fleet Marine Force, Atlantic, and Force Troops, Fleet Marine Force, Pacific. These two organizations are comparable to the Army's Corps troops. They contain the heavy combat support units normally employed in infantry combat operations.

A landing force made up of a regimental landing team and an aircraft group is called a Marine Expeditionary Brigade. The brigade commander may be either a colonel or a brigadier general. Again, he may be either a ground officer or an aviator.

The Marine infantry regiment may be used as a part of a larger force, such as the brigade already mentioned, or it may be employed as a regimental landing team; a typical one would contain approximately 230 officers and 4,470 enlisted men.

The strength of a Marine division is 18,717 officers and men. Combined with an aircraft wing, it forms a unit known as a Marine Expeditionary Force. Like the other assault organizations peculiar to the Marine Corps, it is commonly referred to by its initials.

The MEF is normally commanded by a lieutenant general, with a combined staff of aviation and ground officers. It is normally heavily reinforced with Force Troops units—tanks, heavy artillery, engineers, amphibious tractors and similar units. This sizable force may reach a strength



Men storm beach in amphibious exercise, above, followed by amphibian assault vehicle turreted with a 105mm howitzer.



"Navy-designed troop transports, adapted for helicopters, are able to keep pace with a swift carrier striking force."



of approximately 38,000 men in all.

While the Marine division, regiment and battalion are standard Tables of Organization units, the MEU, MEB and MEF are task organizations whose size and composition depends upon their missions.

Marine Aviation

MARINE CORPS combat doctrine for all units stresses a close coordination between air and ground operations. This demands that air and ground units, at all levels, work hand-in-glove.

In order to insure the high degree of efficiency necessary, ground officers are assigned to aviation staffs and aviators are assigned to infantry staffs. In addition, specially tailored air and ground units are jointly organized to perform specific missions. Such units are controlled by an integrated air-ground command.

Aircraft Units

MARINE aviation is composed of three types of units—aircraft wings, aircraft groups, and aircraft squadrons. Rarely do two wings resemble each other in detail. In a typical organization, squadrons are combined into groups to accomplish a specific mission or function. Such combinations provide a flexible framework for the transfer of squadrons between groups, and groups between wings. This permits a force commander to accomplish any particular mission.

A typical wing operates 320 combat aircraft of all types. It is a balanced air task organization, designed to provide a capability in any of the varying types of tactical air support required in amphibious operations. It must provide air superiority, interdiction and direct support for assault troops.

A Marine aircraft wing can support one or more Marine divisions, or smaller air-ground task forces, depending upon several factors—mission, geographical area of operations,



"The final determining factor has always been, and still is, the man on the ground with the weapon," here a rocket launcher.



Demonstrating versatility, a "Flying Workhorse" lands a 525-gallon rubber tank of fuel during a recent maneuver exercise.

and the existing enemy situation.

Approximately 30 percent of the aircraft in a typical wing are transports. Generally speaking, its helicopter group has a single lift capability of about 1,500 troops. This is the approximate size of a battalion landing team.

Marine air transport squadrons include in-flight refueling aircraft with a troop transport capability.

A typical aircraft wing has a strength of 1,509 officers and 9,331 enlisted.

Readiness for Close Combat

TODAY our country lives in the age of nuclear warfare. Each of our Armed Forces must strive to maintain a complete state of readiness.

We in the Marine Corps feel that with our present strength and tactical doctrine we are capable of fulfilling our assigned mission.

We know full well that missile strikes against any point on the globe are entirely possible. But we also know that unless we, as a country, are willing to carry on a war of complete

mass destruction such strikes are not enough. We must still seize the land occupied by the aggressor and hold it, in order to win.

Marines and soldiers alike believe that in every battle there comes a time when we must close with the enemy to defeat him. The final determining factor has always been, and still is, the man on the ground with the weapon. This man, and what he does, decides who wins or loses. All our efforts in the Corps, therefore, are in support of this man. For us, he is the Marine rifleman.

THOSE who have suggested that the importance of amphibious warfare is declining would do well to re-examine the potential trouble spots of the world. It is the firm conviction of Marines that if another war is forced upon this country the need for the techniques employed in modern amphibious warfare will be greater than ever before.

The Navy-Marine Team stands ready for the task.



Major General Arthur F. Binney, USMC

TODAY'S Marine on the ground has a fast-moving partner with a powerful punch in Marine aviation. Together, they form the Marine Corps air-ground team, a unique meeting of minds and skills between foxhole and cockpit.

This air-ground team trains together, plans together, and fights together as a powerful integrated combat force. Each of the three Marine Divisions has an Aircraft Wing nearby, ready and able to give air support whenever and wherever Marines are called.

So far as I know, no other single service in the world has this unique capability.

Early Combat Action

MARINE aviation was born nine years after the Wright Brothers made their historic flights at Kitty Hawk. In 1912 the first Marine flyer was detailed to the Naval Academy at Annapolis for duty in connection with aviation. Early Marine aviators participated in some of the initial experiments—bombing from a Navy

plane, catapulting from a battleship, and looping a seaplane, to name a few.

As the United States entered World War I, Marine aviation saw a rapid expansion and its first combat test. A Marine aeronautical company flew antisubmarine patrol in the Azores. Shortly thereafter, four Marine squadrons arrived in France and became the Day Wing of the Northern Bombing Group. During the war 222 officers and 2,180 enlisted Marines served in aviation.

In the subsequent demobilization period, Marine aviation strength dropped to a low of 43 pilots in 1921. Despite the drop in manpower, however, the Marine Corps with its aviation arm was the only military service to see combat between world wars.

Marine air served in Santo Domingo, in Haiti, and in Nicaragua in support of ground action. The handful of pilots not only experienced combat in these days but also contributed new tactical concepts to both ground and air warfare. They

In close support of the Marine on the ground—

eAviation-A Partner

pioneered dive-bombing, employment of air-ground communications in combat, transportation of troops and supplies by air, and the evacuation of wounded personnel.

During this period Marines also saw action in the Pacific and the Far East. They performed outpost duty on Guam, and air units flew support for ground troops when Marines were sent to China in 1927.

Back in the United States, other aviators were increasing their knowledge and proficiency in flying. They flew record-breaking flights, established speed records, experimented in blind flying, aerial mapping and photography—laying the groundwork for the future of Marine aviation.

In July 1941, Marine aviation began to expand with the commissioning of two Aircraft Wings. When war came, there were Marine air units in Hawaii and on Wake Island. The Japanese attack at Pearl Harbor wiped out all but one of the Marine aircraft there.

On Wake Island, seven of the twelve Marine planes were destroyed in the first attack. The remaining five planes, however, sank the Japanese destroyer *Kisaraci* and shot down seven enemy planes before the last Marine aircraft was destroyed. Their last plane gone, the survivors of the squadron fought as Marine infantrymen until the fall of Wake.

Replacement aircraft were ferried to the Pacific area and by Christmas

Day 1941, a Marine aircraft group was on Midway Island with dive bombers and fighter planes. They saw little action until June, when the historic battle of Midway took place.

Outnumbered and outclassed by the superior Japanese Zero, Marine pilots were nevertheless unsurpassed in valor. With inferior planes, they met the first savage onslaught of the Japanese strike force. Of their 25 fighter pilots, only 10 survived the first brief encounter; 13 of the 27 dive bombers and their crews were lost. The invasion was repulsed, however, and the stage was set for a United States offensive soon to come.

This offensive was the amphibious invasion of Guadalcanal. Here the importance of aviation to Marine tactics was graphically demonstrated. The Marine air-ground team seized a foothold on the island and staved off repeated attempts by the Japanese to dislodge them.

From Henderson Field, Marine aviation supported the ground troops superbly and devastated the highly vaunted Japanese air force. The myth that Japanese pilots and Zeros were invincible went down in flames.

At Guadalcanal the workhorse of Marine aviation for the remainder of the war—the Corsair—was proven. The Japanese called it “Whistling Death.” The thunder of the Corsairs relentlessly pursued the enemy, through the Gilberts, Marshalls, Carolines, Marianas, Palaus, the Philip-

piners, Iwo Jima, and finally to the Emperor's back door, Okinawa.

Marine pilots shot down their first enemy aircraft at Wake, their last at Okinawa. In the long span of war between, Marine aviators scored 2,355 "kills" and produced 121 aces, five of whom downed 20 or more enemy aircraft—Boyington, Foss, Hanson, Walsh, and Aldrich. The one-two punch of the air-ground team staggered the enemy at every meeting.

Korean Chapter

BETWEEN 1945 and 1950, Marine aviation turned to the task of peacetime development. The advent of the nuclear bomb and the development of the helicopter dictated vast changes in the tactics of the air-ground team. The sudden outbreak of hostilities in Korea gave the Corps a chance to test some of its new theories.

Less than six weeks after the first shot was fired in Korea the Marines were flying air missions from an aircraft carrier. Marine pilots later saw action in support of the 1st Marine Brigade in the Pusan perimeter. They provided close air support for the 1st Marine Division in the Inchon landing and supported the Marines who fought their way through hordes of Chinese Communists from the Chosin Reservoir to Hamhung.

The 1st Marine Aircraft Wing was awarded the Army Distinguished Unit Citation for close air support missions

flown for Army troops during the early fighting in Korea. The citation noted the Wing's "magnificent employment of close-support doctrine" and "exceedingly effective interdiction missions and night combat air patrols . . ."

Marine helicopters also got a workout. They were used to transport entire companies and battalions to the front lines. They flew missions to evacuate casualties and transport supplies to forward units.

Between August 1950 and July 1953, units of the 1st Marine Aircraft Wing flew more than 118,000 sorties, of which more than 39,500 were close support missions for front-line troops. Marine helicopters made nearly 10,000 rescue and evacuation flights and airlifted 500,000 tons.

Doctrine for Nuclear Age

AFTER Korea, the Corps once again turned to the problems posed by new advances in warfare. How would the nuclear bomb affect amphibious assault techniques? Obviously, concentrated masses of Marines swarming ashore as in Pacific landings would present vulnerable targets. Clearly a reassessment of our techniques of waging amphibious warfare was necessary.

As it approached the problem, the Corps realized that any modern concept of amphibious attack must provide great speed, depth and flexibility, and maintenance and use of



Maj. Gen. Arthur F. Binney, USMC
Director of Aviation
Headquarters, U. S. Marine Corps

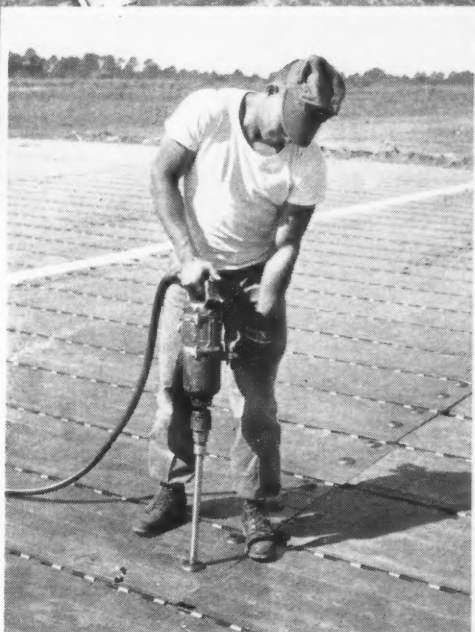


Complete SATS tactical airfield can be taken ashore in a package, quickly assembled for use in a matter of hours.

our own nuclear capability. The evolution of the helicopter provided an important key in forming this new concept.

The following central features characterize the amphibious assault of the nuclear age:

- Helicopter transportability of all assault elements of the landing force.
- Embarkation of the landing force in fast amphibious ships designed for rapid unloading by helicopter.
- Isolation of the objective by the sudden and concentrated destruction of enemy forces in the immediate area.
- Use of the helicopter for tactical movement of troops, supplies.
- Exploitation of all-weather air support to follow the landing force inland as it advances.
- The use of fixed-wing air transport and helicopters to resupply the troops in inland operations.



Advances in Mobility

THE Marine aviation arm of the air-ground team is tailored to fulfill all the requirements of this new amphibious doctrine. Mobility is its keynote. All ground and air units and their equipment are built to reflect this mobility.

This emphasis on mobility is further enhanced by the close ties between Naval and Marine aviation. Marine pilots are trained with Navy pilots, and the aircraft used by the



Operating from deck of *Thetis Bay*, an HUS helicopter demonstrates technique of rescue at sea which has saved lives of many a downed airman in past.

Corps are purchased by the Navy. Marine aviation has the ability to operate from land bases or from aircraft carriers.

In World War II and in Korea, Marines flew support missions for Allied ground forces from carriers. Today, Marine air units are deployed aboard carriers in both the Pacific and Atlantic oceans.

The development of aerial refueling techniques has served to increase Marine aviation's mobility. With flying tankers to serve them as "filling stations of the sky," Marine fighter and attack planes are capable of greatly increased range.

Another development in Marine aviation, and one that furthers the partnership between ground and air units, is the Short Airfield for Tactical Support (SATS). Marine aviators long have pondered the problem of possible deployment of Marine forces to areas where airfield facilities were nonexistent. SATS solves the problem: just take the airfield along with you.

The basic idea of SATS is that all items necessary for construction, operation and support of a complete tactical airfield are available in one package. This package can be transported ashore, the hinged aluminum

plates assembled and placed in operation in a matter of hours after the initial assault. This "mobile airfield" can then be picked up and moved to new locations within a short time.

To control and support flight operations from this short airfield, Marine aviation has developed further innovations. A portable control tower will direct air traffic, and one-man portable radar units will direct ground controlled approaches in bad weather. Portable radio navigation aids and runway lights are also included in SATS. Lightweight canvas domes will be used for operations and maintenance and a tactical airfield fuel dispensing system completes the picture.

The SATS concept greatly increases the value of Marine air in the air-ground team. Wherever the ground Marine goes to fight, an airfield can be set up within easy striking distance of the enemy.

Types of Aircraft

MARINE aviation uses a variety of aircraft to carry out its mission. Here is a brief rundown on the "hardware" flown by the Marine aviator today:

Fighters: To obtain and maintain control of the skies, so necessary for success of a land operation, Marine avia-

tion uses two types of jet aircraft. The Chance Vought FSU Crusader operates against high-altitude, high-speed enemy aircraft. The Douglas F4D Skyray concentrates on defense of the objective area during bad weather or at night. The Skyray will soon be replaced by the newest McDonnell aircraft, the F4H Phantom II.

Attack aircraft: The workhorse for close air support now and for several years to come is the Douglas A4D Skyhawk. It can carry armament loads of 7,000 pounds, either conventional or nuclear, at speeds over 500 mph and place these weapons on pinpoint targets to help the advance of ground Marines.

Transport Helicopters: To transport men and supplies, the Corps is presently using two types of Sikorsky helicopters—the light HUS, comparable to the Army H-34; and the medium HR2S, comparable to the Army H-37. Newer, more versatile 'copters are coming.

Transport Airplanes: To provide assault transport needs for resupply of the objective area, the R4Q Flying Boxcar and the R5D (DC-4) transports are in use. These are in the process of being replaced by the turbo-prop GV-1, Marine Corps version of the Air Force C-130B. This

new transport can double as an assault transport and as an in-flight refueling tanker for fighter and attack planes.

Other Support Aircraft: To provide aerial photo reconnaissance of the objective area, Marine aviation has the F8U-1P, a version of the Crusader fighter. For tactical visual reconnaissance on Division level or lower, the OE light observation plane and the HOK light helicopter are available. The F3D-2Q is an electronic countermeasures aircraft, and provides the landing force commander with a tactical airborne electronic warfare capability.

Partners in Battle

WHEREVER a Marine is poised on the ground for combat, he knows that a Marine pilot, trained in his practiced art of close air support, is likewise poised on a "hot pad" nearby, ready to strike instantly on call.

This is the Marine Corps' air-ground partnership—a partnership born of experience and nurtured on mutual respect and understanding.

With these aircraft in hand and the lessons of the past in mind, Marine Corps aviation is ready to fight today. The test of combat has proven the mettle of Air-Ground partnership.

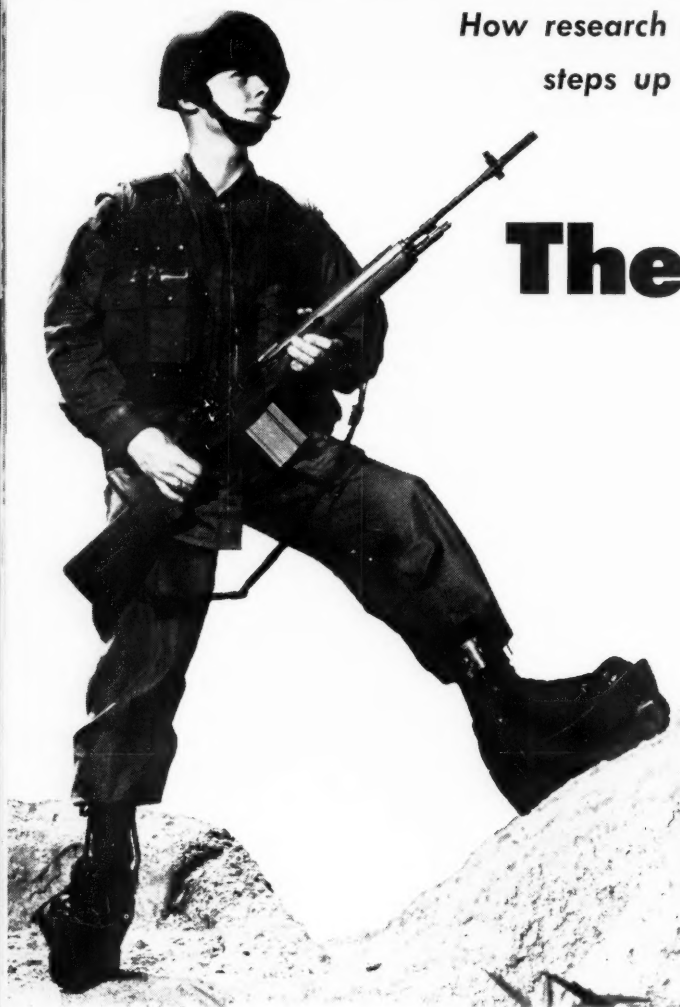
Nation's first turbo-prop aerial tanker, the Lockheed GV-1 Hercules, services two aircraft at once. It can be converted in a few hours into a troop carrier.



*How research and development
steps up combat power of*

The Corps

**Brigadier General
B. A. Hochmuth
USMC**



PERHAPS the most useful project Marine Corps research and development could undertake right now is to design a fool-proof crystal ball which would allow total accuracy in predicting what U. S. Marines need most to fight a war (a) this afternoon; (b) tomorrow morning; (c) ten years from now.

Indeed, this would be a handy item because it is the job of Marine Corps research and development to maintain Fleet Marine Forces—the men

poised for combat—in the best possible state of readiness, from this moment on.

For lack of such a crystal ball, the Marine Corps is looking ahead as far as it can, using logic and reality as guidelines.

The Marine Corps has a specific responsibility to the Nation's defense team—to develop and introduce new tactics, techniques and equipment for landing forces. This is an important responsibility and we work hard at it.

of Tomorrow

We believe that landing forces of the future must be capable of performing the same decisive role in offensive combat as was so vividly demonstrated in World War II and Korea.

As do our sister Services, we realize and appreciate the fact that there will never be enough money to permit development and procurement of all the items we might like to have in our arsenals. Accordingly, these specific criteria are applied in selecting hardware items to be developed by the Marine Corps:

- The developmental items selected must give the greatest increase in combat capability in amphibious warfare at the least cost.
- They must be those which the other Services cannot develop for us.
- They must provide a substantial improvement over what is already available.

In other words, Marine Corps research and development efforts aim to insure that our fighting men, when committed to combat, go into action with the best equipment, tactical doctrine, and organizational structure that can be devised, subject only to the availability of resources and the attainments of technology. The ultimate goal is success in battle.

Concept of Future Employment

BEFORE we can select the best hardware and establish proper tactics

and techniques, however, we must visualize the Marine Corps of tomorrow. This is how we see it:

Marine expeditionary forces will be employed primarily in the amphibious assault mission. Marines will go ashore from ships of an amphibious task force in combination air- and surface-borne assault. VTOL aircraft and amphibian vehicles will be used.

Air-ground combat teams ranging in size from the Marine expeditionary unit (battalion-squadron level) to the amphibious corps (forces in excess of one division and one air wing) will be task organized with appropriate supporting units for specific missions. Marine combat forces will be kept in a high state of readiness at all times.

Marines will move by sea and/or air from either continental or advanced bases as the situation may require. Once ashore in the objective area, they will move primarily on foot, supplemented by light platform vehicles, VTOL transport, conventional motor transport and amphibian tractors.

Marine aircraft, operating initially from aircraft carriers or from land bases within range, will provide close support for ground elements. Navy carrier-based aircraft will supplement Marine aviation until Marine aircraft are established ashore on expeditionary bases. Marine aircraft will be capable of delivering either conven-

tional or nuclear munitions in support of ground forces. The air-ground task force also will be able to request and control air support missions by the Air Force.

Ground combat units will be able to request and direct fire support from Navy ships off shore. Direct support artillery will accompany Marine assault units ashore to provide high-volume, rapid response fires as required. General support artillery will provide the larger calibers, increased ranges, and greater destructive power as needed. Marine artillery will have the ability to deliver both conventional and nuclear fires.

Marine expeditionary forces will be logistically supported by a functional, flexible system characterized by task groupments tailored to specific operations. These forces will develop and maintain a capability to withstand chemical and biological attack, and the capability to continue offensive action in a toxic environment.

That's the way we figure it for the future—beginning tomorrow. Our research and development work is cut out for us. Fortunately, the Marine Corps does not have to tackle the whole program on its own. It can expect to benefit tremendously from programs conducted by the other Services in the areas of their primary responsibilities.

Developments which the Corps initiates in its specific area—tactics, techniques and equipment peculiar to

landing forces in amphibious operations—are coordinated with other Services, assuring proper consideration of their requirements. The Corps also gets a look at developments by other Services with an eye toward their suitability for landing force use.

Navy-Marine Corps coordination is essential in the design of ships, landing craft and certain troop equipment. Likewise, many items developed by the Army for land combat are found suitable for use by landing forces with little or no modification.

Weapons and Tools

FOLLOWING are some items currently under development which are peculiar to landing force operations or to Marine Corps concepts. Not all these are being developed primarily by the Corps; they are items in which the Corps has an interest for use in amphibious assault, regardless of which service is doing the developing.

Amphibious Assault Fuel Supply System.

The Marine Corps is developing such a system to support landing force aviation and ground units ashore with essential fuels during the assault phase of an operation. The overall system will be composed of three supporting subsystems—the bulk fuel system; the tactical airfield fuel dispensing system; and the forward area fuel dispensing system.

The bulk fuel system will be designed to receive fuel at the high water mark on the beach from the Navy

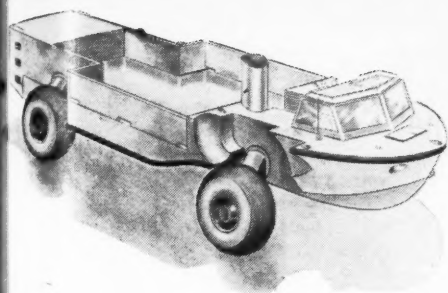


Brigadier General B. A. Hochmuth, USMC

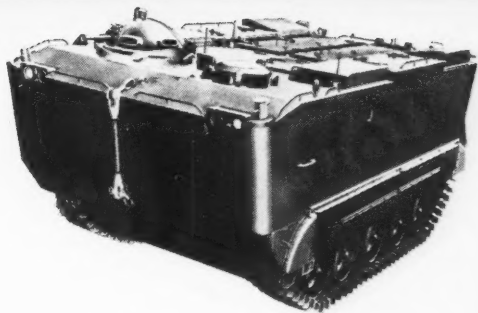
Deputy Chief of Staff

(Research and Development)

Headquarters, U. S. Marine Corps



In continual effort to increase landing force efficiency, new landing vehicle, wheeled, is now under development.



Fully-tracked landing vehicle is armored amphibian carrier that also can be used to transport troops or cargo over land.

ship-to-shore fuel transfer system, and to transport the fuel via hose-line to a storage area inland from the beach (normally no more than three miles). It will be able to dispense fuel to bulk fuel transporters, vehicles, and equipment at 500 gallons per minute.

The tactical airfield system will receive, store and dispense fuel to aircraft, vehicles and equipment at each tactical support airfield in the objective area.

The forward area dispensing system will provide the means for transporting large quantities of bulk fuel from the bulk system to the airfields when, because of distance, it cannot be transferred directly. Fuel transporters developed by the Army may meet some of the component requirements.

Improved Helicopter Lift. The Marine Corps and Navy are developing a small assault support helicopter for observation/evacuation needs and a

family of light and medium helicopters with improved payload capabilities. These 'copters will be able to operate efficiently in hot temperatures and to altitudes of 6000 feet with no decrease in payload or performance.

A2F Light Attack Aircraft is the major operational element of an all-weather attack weapon system being developed by the Navy for Navy and Marine Corps use. This system will locate, identify, and destroy distant enemy targets, and also provide close combat air support to ground forces. It will also be able to operate without difficulty from small Marine expeditionary airfields in the battle zone.

F4H Fighter Aircraft. The F4H, a high-speed fighter aircraft being developed by the Navy for Navy and Marine Corps use, will provide an airborne weapon system capable of defending the landing force against air attack. The airplane is also designed for at-

Fuel is pumped from a DUKW into storage tanks on beach to provide motive power for fast-moving Marines.





Developed for Marine Corps by the Army, first automatic field artillery weapon will fire six 115mm rounds in 2½ seconds.

Leatherneck of today is symbolized by infantryman with M14 rifle, operator of antitank vehicle and the helicopter.



tack missions with an external special weapon.

Short Airfield for Tactical Support (SATS). Now in advanced stages of development is an all-weather airfield which can be quickly installed and easily maintained, and which will accommodate all types of Marine Corps fixed-wing aircraft. This airfield, called SATS, employs aluminum matting in combination with catapults and arresting gear, and includes a fuel system and electronics equipment for support operations. While some SATS items were developed by the Marine Corps, the majority were developed by the Bureau of Naval Weapons.

Multipurpose Vehicle (SCAMP). The Marine Corps is developing a multipurpose vehicle of exceptional cross-country mobility known as SCAMP (Sectionalized Carrier And MultiPurpose vehicle). Its multipurpose capabilities stem from a variety of trailing units that can be married to the prime mover. SCAMP is so constructed that it can readily be sectionalized into two loads, each of which can be lifted by a medium transport helicopter. It is currently being evaluated as a possible replacement for general and special purpose vehicles of greater than ¾-ton capacity.

Assault Life Preserver. A compact, lightweight yoke-type life preserver is under development by the Marine Corps. This preserver is designed to provide emergency flotation to individuals in assault operations whether they are transported by landing craft, amphibian vehicles, or helicopters. It weighs three pounds or less, yet will support at least 300 pounds.

115mm Artillery Weapon (XM 70). The 115mm direct support artillery weapons system (XM 70) is being developed by the Army Ordnance Corps to fulfill a Marine Corps requirement for a lightweight, helicopter-transportable weapon which will be superior to current light artillery in terms of weight, accuracy, rate of fire, and lethality. The XM 70 is this coun-

Undergoing test is new sectionalized carrier and multipurpose vehicle (SCAMP) to increase land mobility.



try's first automatic fire field artillery weapon, capable of delivering either single shot or bursts at the rate of six rounds in $2\frac{1}{2}$ seconds. A unique feature of the XM 70 is its use of rocket-boosted ammunition which provides increased range capabilities while permitting lighter construction of the launcher.

Landing Vehicle Tracked, Personnel—Model 6 (LVTP 6). The Navy Bureau of Ships has developed for the Marine Corps the LVTP 6, an armored, amphibious, full-tracked vehicle for transport of personnel and/or cargo from ship-to-shore, and for use as a land carrier. This vehicle represents an improvement over the present standard LVTP 5 in terms of agility and mobility, reduced complexity, and better payload to gross weight ratio. A pre-production model is undergoing service test and has been adopted, subject to modifications resulting from current tests by the Army, as Standard A.

Landing Vehicle, Wheeled (LVW). To fill the landing force requirement for a wheeled vehicle with greater water speed and improved land mobility characteristics, the Marine Corps currently has under development the LVW. This amphibian will be constructed of welded aluminum plating and framing, and its basic shape will be a V-bottom planing hull to obtain high speeds with good sea-keeping qualities. The LVW will be powered by a Lycoming T55 gas turbine engine expected to provide water speeds up to 30 knots, land speeds of 35 mph.

Intelligence Reporting System (BASIC). Battlefield Area Surveillance and Integrated Communication is an electronic

means of transmitting tactical intelligence from ground and airborne observers and presenting it instantaneously and comprehensively in the appropriate command post. The observer, selecting the desired characters, symbols and numerals from those available in his message entry device, sets up his message, checks it for accuracy and burst transmits it through normal communication channels. These digital message transmissions can be carried on simultaneously with normal voice communications. Data from many observers can be received, displayed and/or stored at the Command Post.

These are but a few examples of what the Corps of tomorrow will have and use to carry out its mission as the United States' amphibious force-in-readiness.

Eyes to the Future

RESEARCH and development is a never-ending task which demands foresight and creative thinking based to a considerable extent on hindsight and experience. The Corps of tomorrow is being built today through the combined efforts of the Marines themselves, their comrades-in-arms in the other three Services, and the scientists and craftsmen of American industry. It could be accomplished no other way.

Meanwhile, the Marine Corps' research and development program is geared to stay abreast of technological advances designed to increase the combat capability and fighting efficiency of our most important weapon—the individual Marine. We intend that he shall have the best conceivable tools with which to do his job.



of professional interest

Award to Army Scientists

Awards totalling \$25,000 have been presented to three Army civilian scientists credited with developing nuclear warheads for the portable Davy Crockett battlefield weapon. Secretary of the Army Elvis J. Stahr, jr., presented a check for \$15,000 to Robert M. Schwartz, and for \$5,000 each to Milton E. Epton, and to Mrs. Sandra Mayer, widow of the late Irving Mayer. The three scientists played a key role in developing a nuclear capability for the 280mm cannon and the Davy Crockett system; they also developed nuclear adaptation kits for the Honest John rocket and Jupiter intermediate range ballistic missile. All are or were formerly employees of the Ordnance Special Weapons Ammunition Command, Picatinny Arsenal, New Jersey.

Anti-Tank Entac

Decision to purchase the Entac guided missile system to replace the SS-10 for use against enemy tanks has been announced. The Army Rocket and Guided Missile Agency, an element of Army Ordnance Missile Command, will be commodity manager of the system. Like the SS-10, the Entac is a French army development.

Entac is a contraction of the French identifying description, ENgin Teleguided Anti-Char. Missile and launcher weigh 37 pounds; the missile in flight weighs 27 pounds. It carries a shaped charge warhead and utilizes a solid propellant rocket motor. Entac is directed to the target by an operator who maneuvers a stick to give correction commands transmitted through fine wires attached to the missile.

Improved Radar

Radar equipment ten times more discriminating in target detection than present operational equipment now is in production for the Army's surface-to-air Nike-Hercules missile. The new equipment will reach out substantially in excess of the present system for enemy aircraft. The improved Nike-Hercules system incorporating the new high powered acquisition radar and the target ranging radar has been completed, and construction necessary for installation of the new equipment is currently taking place at Nike-Hercules sites.

Land-Based "Carrier"

An Army airfield with its runways closed and jammed with participating aircraft served as the *USS Boxer*, a simulated Navy helicopter carrier, to provide realistic touches for Operation Avia-Launch recently staged at Camp Mackall. The field was Simmons Army Airfield, serving as a Navy helicopter carrier during the exercise that simulated entry of massed aviation in a Strategic Army Corps (STRAC) airhead.

For entrance into the airhead, STRAC aviation units were formed into an Army Aviation Task Force under the 82d Aviation Battalion. Following detailed briefings by the Aviation Battalion staff on routes, navigation aids and communications, the pilots rushed to their "aircraft" and were launched Navy-style during a night operation. When they had established their airhead, the aviation task force turned attention to active support of the Army Training Test of the 2d Airborne Battle Group, 504th Infantry, plus other missions.

M-151 Trucks on Order

A contract for 7,524 quarter-ton utility trucks, with related services and repair parts, has been awarded to the Ford Motor Company. The tactical support vehicle, which will be designated M-151, is air droppable, features rugged construction, cross-country mobility, low fuel consumption, economical maintenance.

Pershing Test

In a recent successful firing test at Cape Canaveral, Florida, the Army's Pershing ballistic missile exceeded maximum range of the Redstone missile that it will replace. The Pershing, using high performance first and second stage motors, met all test objectives.

While pre-set to cover less than its maximum range, the solid-fueled Pershing traveled beyond the range limit of the liquid-fueled Redstone, now operational with Army units in Europe.

Two pieces of ground support equipment planned for use by troops were used in the most recent firing. The Pershing was fired from its mobile transporter-erector-launcher which in turn was mounted on a tracked prime mover.

The Martin Company, Orlando, Florida, has been developing the Pershing under technical supervision of the Army Ballistic Missile Agency. Motors were designed and developed by Thiokol Chemical Corporation, Redstone Division.

Special Forces Detachments

Reorganization of Army National Guard Special Forces detachments of several states brings them under the same tables of organization and equipment applicable to their active Army counterparts. Previously these units were organized into operational detachments of personnel needed for a combat mission; administrative and other support type members were lacking.

Special Forces detachments of Alabama, Louisiana, North Carolina, Utah and West Virginia Army National Guard have now been reorganized in companies, each with sufficient administrative and supply personnel to support the 12-man operational detachments. Companies have been placed under a Group Headquarters for command and logistical support. Training goal for the units is readiness for combat theater use in a relatively short time after mobilization.

For your convenience . . .

Superintendent of Documents
U. S. Government Printing Office
Washington 25, D. C.

Please enter a subscription for one year (twelve issues) for ARMY INFORMATION DIGEST.

I enclose payment of ☐ \$2.25 for mailing to domestic or APO address.

☐ \$3.00 for mailing to foreign address.

Send to

Address

Single copy to U. S. or APO address, 25 cents; foreign, 32 cents.

(Make check, postal or money order payable to Superintendent of Documents.)

How to get the Digest?



Commanders -- It's up to you to put the Army's official magazine in the hands of soldiers and civilians in your outfit. See Army Circular 310-41 (5 April 1961) and . . .

Request sufficient copies to insure prompt circulation . . . using DA Form 12-4 (Request for Initial Distribution of Publications and Blank Forms).



1961 – Golden Anniversary of Naval Aviation

Only a few years after the Wright Brothers had launched a successful flight from the sands of Kitty Hawk, Navy Captain Chambers and Glenn Curtiss launched an aircraft from the decks of the cruiser *Birmingham*.

To be useful to the fleet, however, an airplane would have to land and take off from a ship. This was first accomplished on 18 January 1911 when Eugene Ely landed a Curtiss pusher on a specially built platform aboard the armored cruiser *Pennsyl-*

vania at anchor in San Francisco Bay. Less than an hour later Ely took off and returned to Selfridge Field in San Francisco.

History's first shipboard landing and take-off was only one of many events during that year in which naval aviation was born. To commemorate these accomplishments the Secretary of the Navy has designated the entire year 1961 as the Golden Anniversary of Naval Aviation.

